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THE  
JOURNAL  
OF THE  
ROYAL GEOGRAPHICAL SOCIETY.

VOLUME THE TWENTY-EIGHTH.

1858



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1858.

EDITED BY DR. NORTON SHAW

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## ERRATA.

## JOURNAL, VOL. 27.

Page 23, note, 5,296,320, instead of 5,286,320.

„ 120, note, read *Society*, instead of *Journal*.

„ 127, line 21, read *Pasitigris*, instead of *Pastigris*.

## JOURNAL, VOL. 28.

Page 371, line 3 from bottom, for *Suffolk* read *Griffith Island*.

„ 414, line 31 from top, for 40° 35' read 49° 35'.

„ 415, middle of page, to 2200 add *feet*: the same 2 lines below.

# Royal Charter of Incorporation

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON,

1859.

---

Victoria, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, To all to whom these Presents shall come, Greeting.

WHEREAS Sir Roderick Impey Murchison, Knight, and others of our loving subjects did, in the year one thousand eight hundred and thirty, establish a Society, by the name of *The Royal Geographical Society*, for the advancement of Geographical Science, and of which Society we have become the *Patron* :

AND WHEREAS it has been represented to us that the same Society has since its establishment sedulously pursued such its proposed object, by collecting, registering, digesting, and, from time to time, publishing an annual *Journal* of Transactions, which have contributed to the progress of geographical knowledge ; by

carrying out, at its own expense, various important Expeditions in every quarter of the Globe, and by assisting other Expeditions with grants of money and otherwise; and that distinguished individuals in foreign countries, as well as British subjects, have availed themselves of the facilities offered by the same Society for communicating important discoveries, greatly extending geographical knowledge :

AND WHEREAS the same Society has, in aid of its objects, collected a large and valuable *Library* of Scientific Works, Atlases, Maps, Charts, Plans, Views, and Instruments, to which fresh accessions are constantly being made; and the said Society has hitherto been supported by Donations, and annual and other Subscriptions and Contributions to its Funds :

AND WHEREAS, in order to secure the property of the said Society, to extend its operations, and to give it a more permanent establishment among the scientific Institutions of our Kingdom, we have been besought to grant to the said Sir Roderick Impey Murchison, Knight, and to those who now are, or shall hereafter become, Members of the said Society, our *Royal Charter of Incorporation* for the purposes aforesaid.

NOW KNOW YE, that We, being desirous of encouraging a design so laudable and salutary, of our especial *Grace*, certain knowledge, and mere motion, have willed, granted and declared, and Do, by these Presents, for us, our *heirs*, and *successors*, will, grant and declare, that the said Sir Roderick Impey Murchison, Knight, and

such other of our loving subjects as now are Members of the said Society, or shall from time to time be elected *Fellows* thereof, according to such Regulations, or Bye-Laws, as shall be hereafter framed or enacted, and their successors, shall for ever hereafter be, by virtue of these *Presents*, one body politic and corporate, by the name of "*The Royal Geographical Society*;" and for the purposes aforesaid, and by the name aforesaid, shall have perpetual succession and a *Common Seal*, with full power and authority to alter, vary break, and renew the same at their discretion, and by the same name, to sue and be sued, implead and be impleaded, answer and be answered unto, in every court of us our *heirs* and *successors*, and be for ever able and capable in the law, to purchase, receive, possess, hold and enjoy, to them and their successors, any goods and chattels whatsoever; and also to be able and capable in the law (notwithstanding the Statutes of Mortmain), to take, purchase, hold and enjoy, to them and their successors, a *Hall or House*, and any such messuages, lands, tenements, or hereditaments whatsoever, as may be necessary for carrying out the purposes of the Society. The yearly value of which, including the site of the said Hall or House, shall not exceed in the whole the sum of eight thousand pounds, computing the same respectively at the rack rent which might have been had or gotten for the same respectively at the time of the purchase or acquisition thereof; and to act in all the concerns of the said Body politic and corporate, as effectually, to all intents and purposes, as any other of our liege subjects, or any other body politic or corporate, in our said Kingdom, not being under any disability, might do in their respective concerns.



AND we do hereby grant our especial licence and authority, unto all and every person and persons, bodies politic and corporate, otherwise competent to grant, sell, alien, and convey in Mortmain, unto and to the use of the said body politic and corporate, and their successors, any messuages, lands, tenements, or hereditaments, not exceeding such annual value as aforesaid.

AND our will and pleasure is, and we further grant and declare, that there shall be a General Meeting, or General Meetings of the Fellows of the said Society, to be held from time to time as hereinafter mentioned; and that there shall be a *Council* to direct and manage the concerns of the said body politic and corporate, and that the General Meetings and the Council shall have the entire direction and management of the same, in the manner and subject to the regulations hereafter mentioned.

AND we do hereby also will, grant and declare, that there shall be a President, Vice-Presidents, a Treasurer, and Secretaries of the said body politic and corporate; and that the Council shall consist of the President, Vice-Presidents, Treasurer, Trustees, Secretaries, and not more than twenty-one, nor less than twelve, other Fellows of the said Society.

AND we do hereby further will and declare, that the said Sir Roderick Impey Murchison, Knight, shall be the first President of the said body politic and corporate; and the other persons now being the Vice-Presidents, Treasurer, Trustees, Secretaries, together with twenty-one Members of the Council, shall be the first Members of the

Council, and shall continue such until the election of Officers shall be made in pursuance of these presents.

AND we do hereby further will and declare, that it shall be lawful for the Fellows of the said body politic and corporate hereby established, to hold a General Meeting once in the year, or oftener, for the purposes hereinafter mentioned, namely, That the President, Vice-Presidents, the Treasurer, the Secretaries, and other members of the Council, shall be chosen at such General Meeting, and that the General Meetings shall from time to time make and establish such Bye Laws, and vary and alter, or revoke the same, as they shall deem to be useful and necessary for the regulation of the said body politic and corporate, for the admission of Fellows and of Honorary and Foreign Members, and for the fixing the number of the Presidents, Officers, and for the management of the proceedings, and the estates, goods, and business of the said body politic and corporate, so that such Bye Laws be not repugnant to these presents, or to the Laws and Statutes of this our realm, and shall and may also enter into any resolution and make any regulation respecting the affairs of the said body politic and corporate that may be necessary and proper.

AND we do further will and declare that the General Meetings shall take place at such time as may be fixed by the said Council, and that the present regulations of the said Society, so far as they are not inconsistent with these presents, shall continue in force until the same shall be altered by a General Meeting.

AND we further will, grant and declare, that the Council shall have the sole management of the income and funds of the said body politic and corporate, and the appointment of Secretary, Librarian, Curator, and such other officers, attendants, and servants, as the Council shall think necessary or useful, as also the entire management and superintendence of all the other affairs of the said Society, and shall and may, but not inconsistently with or contrary to the provisions of this our Charter, or any existing Bye Law, or Laws and Statutes of this our realm, do all such acts and deeds as shall appear to them necessary for carrying into effect the objects and views of the said body politic and corporate.

PROVIDED always, and we do will and declare, that the Council shall from time to time render to a General Meeting a full account of their proceedings, and that every Fellow of the Society may, at all reasonable times, to be fixed by the said Council, see and examine the accounts of the receipts and payments of the said body politic and corporate.

AND we further will, grant and declare, that the whole property of the said body politic and corporate shall be vested, and we do hereby vest the same solely and absolutely in the Fellows thereof, and that they shall have full power and authority to sell, alienate, charge, and otherwise dispose of the same as they shall think proper; but that no sale, mortgage, incumbrance, or other disposition of any messuages, lands, tenements, or hereditaments belonging to the said body politic and

corporate shall be made, except with the approbation and concurrence of a General Meeting.

AND we lastly declare it to be our *Royal Will and Pleasure*, that no Resolution or Bye Law shall on any account or pretence whatsoever be made by the said body politic and corporate in opposition to the general scope, true intent, and meaning of this our Charter, or the Laws or Statutes of our realm, and that if any such Rule or Bye Law shall be made, the same shall be absolutely null and void to all intents, effects, constructions, and purposes whatsoever.

IN witness whereof we have caused these our Letters to be made Patent.

WITNESS Ourselves, at our Palace at Westminster, this eighth day of February, in the twenty-second year of our reign.

By Her Majesty's command.

(Signed) EDMUNDS.

# Royal Geographical Society.

1858.

## REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING ON THE 24TH MAY.

THE Council have the pleasure to submit their Annual Report of the financial state and progress of the Royal Geographical Society; and they refer with satisfaction to the evidence it affords of increased prosperity and extended usefulness.

*Members Ordinary, Honorary, and Corresponding.*—Since the last Anniversary 166 Ordinary Members have been added to the list of Fellows; 3 Honorary Members have also, upon the recommendation of the Council, been elected—M. de la Roquette, Vice-President of the Geographical Society of Paris; William Haidinger, Vice-President of the Imperial Geographical Society of Vienna; and General Alberto della Marmora, of Sardinia; and two Corresponding Members—David Livingstone, Esq., M.D., Her Majesty's Consul at Tete, Quillimane, and Sena; and M. V. A. Malte-Brun, Secretary of the Geographical Society of Paris. During the same period the Society has lost 18 Ordinary Members. Also Colonel Carl Falkenstein of Dresden, and Augustus Zeune of Berlin, Honorary Members; and Major-General Oberreit, of Dresden, a Corresponding Member of the Society.

The Society now comprises 1090 Ordinary and 58 Honorary and Corresponding Members.

*Finances.*—The financial statement annexed to this Report, shows a material improvement in every branch of revenue susceptible of increase; whilst the excess of expenditure over estimates is confined to those heads of account which peculiarly

indicate the extension of the Society's relations, viz., the "Journal and Proceedings," and the "Library and Map-rooms."

The permanent fund of the Society consists of 3000*l.* New 3 per Cent. Consols, to which may be added a sum of 500*l.*, at present in deposit at the Union Bank.

*House.*—The insufficiency of the accommodation afforded by the Society's Rooms for the largely increased attendance at our Evening Meetings, has been long felt, and various remedial plans have been considered, all of which have been successively set aside for inadequacy or expensiveness. In this difficulty the use of the large Hall at Burlington House has been kindly accorded by the authorities of the University of London and the Royal Society; the arrangement, however, can only be considered as temporary, and the subject of adequate permanent accommodation still presses upon the attention of the Council.

*Publications.*—Volume 27 of the Journal, containing many valuable and important papers, and 14 beautiful maps, with other illustrations, has recently been published under the Editorship of Dr. Shaw.

Nos. 9, 10, and 11 of the Proceedings, for last Session, with index, contents, and title-page, completing the first volume, and Nos. 1 and 2 of the second volume, also edited by Dr. Shaw, have been published and circulated free to the Fellows of the Society. Copies are also obtainable by the public at a very moderate cost.

The Manchester Literary and Philosophical Society, the Hungarian Academy of Sciences at Pesth, the Calcutta Public Library, the Geographical Establishment of Justus Perthes at Gotha, and the "Bureau des Colonies du Ministère de la Marine" of France, have been added to the list for presentation, copies of the 'Proceedings' of the Society.

*Map-Rooms.*—The accessions to this department during the period under review consist of 1337 Maps and Charts, all of which have been mounted on the establishment, and arranged in their proper geographical order; in addition to which, upwards of 1800 maps and charts have been mounted and re-arranged. A general catalogue is now in course of formation, and several improvements have been effected in the arrangement

of the Map-rooms in order to facilitate a more ready reference to these extensive collections. The desire of many members of the Society, and others about to set out for imperfectly known countries, for instructions how best to make their labours useful to geography, referred to in a sub-committee report, entitled 'Hints to Travellers,' published in the 24th volume of the Society's Journal, has been farther carried into effect in this department by the Curator, Mr. George, who has given practical instruction in the use of instruments to intending explorers.

The following, among many other important acquisitions, may be specially noticed:—Charts published by the Hydrographic Department of the Admiralty, and by the French *Dépôt de la Marine*; Maps, plans, and views, published by the Statistical Department of the War-Office; Fullarton's Royal Illustrated Atlas; Blackie's Imperial Atlas; additional sheets of the Government maps of Sardinia, Norway, the Netherlands; the Atlas of Bavaria; Atlas de la Republica Mexicana; Plans relating to improvements in the city of Vienna; Findlay's Atlas of Ancient and Modern Geography; Keith Johnston's Travelling Map of Scotland; Devine's Map of North-West portion of Canada; Map of the World in Chinese characters, by P. M. Ricci, and six other Chinese maps of great rarity and value, presented by our Associate Mr. Lockhart; Papen's Geological Map of Europe, by Ravenstein; Maps of Wisconsin, &c., by Colonel Graham; Stanford's Maps of India, Delhi, &c.; Plan of the Island of Chusan, by Major-General Schoedde; Maps of South Africa, by R. Moffat; Map of the Island of Java, by Dr. Junghuhn; Maps of the River Yang-tse-Keang, presented by Col. A. H. Gordon, of the Quartermaster-General's Department, and by Capt. Collinson, R.N.; also Reports of the United States Coast Survey, from Professor Bache.

*Library.*—Several important alterations and improvements have been effected in this department. The works bequeathed to the Society by the late Mr. Greenough have been incorporated in the Library; additional shelving has been erected; the Library Catalogue has been carried up to date; a systematic plan has been adopted, combining the advantages of rapid and easy reference with a geographical arrangement; about 200 volumes, much in demand, have been purchased; several hundred volumes

have been bound ; and, with a view to durability, some thousands of maps contained in the books, have been mounted. The accessions to the Library by donation and purchase, consist of nearly 900 volumes and pamphlets, among which are Livingstone's 'Travels and Researches in South Africa ;' Atkinson's 'Oriental and Western Siberia ;' Pinkerton's and Laharpe's Collections of Voyages and Travels ; Wilkinson's 'Ancient Egyptians,' 'Dalmatia and Montenegro,' &c. ; Belcher's Voyages of H.M.S. Sulphur and the Samarang ; Beechey's 'Voyage of Discovery towards the North Pole ;' Bartlett's Pictorial Illustrations of Jerusalem, Canada, &c. ; Bingham's, Davis's, Fortune's, Gützlaff's, and Milne's works on China ; Lloyd's 'Travels in India ;' Kupffer's 'Annales de l'Observatoire Physique Central de Russie ;' Selections from the Records of the Government of Bengal ; Carter's 'Geological Papers on Western India ;' the 4th edition of Somerville's 'Physical Geography ;' Meldrum's 'Contributions to the Meteorology and Hydrography of the Indian Ocean ;' the 'Minutes of the Committee of Council on Education ;' 'Boletim e Annaes do Conselho Ultramarino' of Portugal ; Perez-Rosales' 'Chile ;' Malte-Brun's 'France Illustrée ;' McCulloch's 'Descriptive and Statistical Dictionary of the British Islands ;' the third volume of Perry's 'Japan Expedition ;' numerous Reports of Congress ; Emory's 'Mexican Boundary Report ;' Transactions of the University of Christiania ; of the Geographical Societies of Berlin, Bombay, Darmstadt, New York, Paris, St. Petersburg, and Vienna ; of the Smithsonian Institution of Washington ; of the Imperial Geological Institute of Vienna ; of the American Academy of Sciences, and the Academies of Science of Berlin, Lisbon, Madrid, Munich, Paris, St. Petersburg, Stockholm, Vienna.

*Expeditions.*—Two important expeditions have set forth from this country since the last Anniversary : one, under our Corresponding Member and Medallist Dr. Livingstone, assisted by several distinguished officers, to ascend the Zambesi, and renew his explorations in Africa ; the other under Capt Hawkins, R.E., also a Member of this Society, to survey, in conjunction with the United States Commissioners, the boundaries of Her Majesty's dominions in North America, and those of the United States. In compliance with the desire of the Foreign Office, suggestions



have been prepared by the Council for the use of these expeditions, and various instruments have also been placed at the service of Dr. Livingstone. Communications from other expeditions have been received and duly reported at the Evening Meetings;—from that under Captains Burton and Speke in East Africa, which by the last accounts had penetrated the interior to within 170 miles of Ugogo; from that under Captain Palliser in British North America, which had reached  $109^{\circ}$  w. on the Saskatchewan; from those in Australia under Captain Freeling and others; from Borneo, under Lieutenant de Crespigny; and from the Indian Archipelago, under Mr. A. R. Wallace, whose paper on the Arru Islands has recently been published in the 'Proceedings' of the Society. Other expeditions and proposed explorations have engaged and still occupy the attention of the Council.

*Education.*—The services of our Secretary, Dr. Shaw, have again been put in requisition by the Committee of the Privy Council on Education, to assist in the examination of candidates for Geographical Lectureships; and the Council have felt great pleasure in again placing Apartments in the Society's House at the disposal of the Committee for the purpose of this examination.

*Royal Premium.*—The Founder's Gold Medal has been awarded to Captain Richard Collinson, R.N., C.B., for his successful discoveries in the Arctic Regions, and for having, in H.M.S. *Enterprise*, penetrated farther to the eastward, through Behring Strait, than had been reached by any other vessel; and the Patron's or Victoria Medal to Professor Alexander Dallas Bache, Superintendent of the United States Coast Survey, for his extensive and most accurate surveys of America, and for the additions made by him to our knowledge of Geography and Hydrography.

In conclusion, the Council have to notice that the privilege, accorded to the public of free access to the Society's valuable collections of Maps and Charts, is daily becoming better known and appreciated; also that the general desire for more accurate information on all cognate subjects, now so liberally encouraged by Her Majesty's Government, fully keeps pace with the measures taken by this Society for the increased, and more rapid, diffusion of geographical knowledge.

BALANCE-SHEET FOR THE YEAR 1857.

Receipts.

Expenditure.

	£.	s.	d.		£.	s.	d.
Balance at the Banker's, January 1st	..	..	1106 17 3	Publications—Journal and Proceedings	..	..	858 9 11
Subscriptions of 536 Fellows	..	..	1072 0 0	Salaries	..	..	740 0 0
Compositions of 27 Fellows	..	..	665 0 0	Rent, Taxes, and Wages, &c.	..	..	718 9 0
Entrance Fees of 159 Fellows	..	..	477 0 0	Library and Map Room	..	..	343 6 8
Government Annual Grant	..	..	500 0 0	Office Expenses	..	..	194 0 2
Arrears of Subscriptions	..	..	72 0 0	Greenough Bust	..	..	50 0 0
Sale of Publications	..	..	146 19 2	Royal Premium, Gold Medals	..	..	46 14 0
Interest on 3000 <i>l</i> .	..	..	98 6 2	Instruments for Dr. Livingstone	..	..	25 0 0
Royal Premium Grant	..	..	52 10 0	Overpaid Subscriptions returned	..	..	5 0 0
Rent of Stables	..	..	50 0 0	Purchase of 400 <i>l</i> . New 3 per Cents.	..	..	378 0 0
Subscriptions overpaid	..	..	8 18 0	Deposit at the Union Bank	..	..	500 0 0
				Balance at Banker's, December 31	..	£ 354 1 4	
				Ditto in Secretary's hands	..	36 9 6	
							390 10 10
							<u>£ 4249 10 7</u>

Audited, and found correct.

ROBERT BIDDULPH, *Treasurer*.

15, Whitehall Place, 31st March, 1858.

THOS. H. BROOKING,  
F. OSBORNE SMITH,  
THOS. LEE, } *Auditors*.

## ESTIMATE FOR THE YEAR 1858.

## Receipts.

## Expenditure.

	£.	s.	d.		£.	s.	d.
Annual Subscriptions .. .. .	1150	0	0	Journal and Proceedings .. .. .	850	0	0
Life Compositions .. .. .	400	0	0	Rent, Wages, Lights and Firing .. .. .	650	0	0
Entrance Fees .. .. .	350	0	0	Salaries .. .. .	800	0	0
Arrears of Subscriptions .. .. .	50	0	0	East African Expedition .. .. .	250	0	0
Sale of Publications .. .. .	150	0	0	Royal Premium Awards .. .. .	52	10	0
Royal Premium Grant .. .. .	52	10	0	Library and Map Rooms .. .. .	250	0	0
Government Annual Grant .. .. .	500	0	0	Office Expenses .. .. .	250	0	0
Dividends on Stock .. .. .	100	0	0	Sundries for Balance .. .. .	40	10	7
Cash Balance, 1st January, 1858 .. .. .	390	10	7				
	£3143	0	7		£3143	0	7

NORTON SHAW.

## SECRETARIAL DUTIES.

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The following Resolutions have been passed at the Council, and are submitted to the General Meeting for confirmation, in substitution for Section V. p. 13 of the present Regulations :—

I. That Section V. of the printed Regulations of the Society, and also the Resolution of the General Meeting, 1847, relating to the duties of the Secretaries, be recommended by the Council to be abrogated at the next General Meeting.

II. That the following be henceforth the Rules defining the duties of the Honorary Secretary and Foreign Secretary, and of the Acting Secretary respectively :—

III. That the Honorary Secretary shall attend all the ordinary and extraordinary meetings of the Society, reading thereat (in conjunction with the Acting Secretary) all those memoirs which their authors decline to read ; that he make abstracts of all memoirs read before the Society, and that, conjointly with the Treasurer and the Acting Secretary, he should countersign all accounts. Farther, that he have charge of the scientific instruments belonging to the Society, advising as to their purchase, use, and management ; and that he be authorised to offer suggestions to all explorers of foreign lands, and also prepare from time to time a brief analysis of any printed geographical work for publication in the ‘ Proceedings.’

IV. That the Honorary Foreign Secretary conduct the foreign correspondence and translate communications sent to the Society in foreign languages.

V. That the Acting Secretary attend all meetings whatever, reading the minutes of the previous meeting at the ordinary evening meetings, and transacting all the business of the Council and Committees of Council, both by reading the minutes and by taking at the time an accurate minute of each resolution, and by seeing that the same be correctly copied and entered in the books of the Council. That he conduct the correspondence of the Society, and be the editor of the ‘ Journal’ and ‘ Proceedings,’ that he have the immediate superintendence of all persons employed by the Society, have charge of all its books and maps, and see that they are properly arranged and catalogued.

## Library Regulations.

---

I. The Library will be open every day in the week (Sundays excepted) from *Eleven* in the morning to *Five* in the afternoon,\* except on New-Year's Day, Good Friday to Easter Monday inclusive, and Christmas week, and it will be closed one month in the year, in order to be thoroughly cleaned, viz. from the first to the last day of September.

II. Every Fellow of the Society is entitled (*subject to the Rules*) to borrow as many as four volumes at one time.

*Exceptions :—*

1. Dictionaries, Encyclopædias, and other works of reference and cost, Minute Books, Manuscripts, Atlases, Books and Illustrations in loose sheets, Drawings, Prints, and unbound Numbers of Periodical Works, *unless with the special written order of the President.*
2. Maps or Charts, *unless by special sanction of the President and Council.*
3. New Works before the expiration of a month after reception.

III. The title of every Book, Pamphlet, Map, or Work of any kind lent, shall first be entered in the Library-register, with the borrower's signature, or accompanied by a separate note in his hand.

IV. No work of any kind can be retained longer than one month; but at the expiration of that period, or sooner, the same must be returned free of expence, and may then, upon *re-entry*, be again borrowed, provided that no application shall have been made in the mean time by any other Fellow.

V. In all cases a list of the Books, &c., or other property of the Society, in the possession of any Fellow, shall be sent in to the Secretary *on or before the 1st of July in each year.*

VI. In every case of loss or damage to any volume, or other property of the Society, the borrower shall make good the same.

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## F E L L O W S.

(To AUGUST, 1859.)

N.B.—Those having \* preceding their names have compounded for life.

Those having † have requested to be placed on the list as abroad.

Year of Election.	
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1855	Acland, Prof. Henry Wentworth, M.D. <i>Oxford.</i>
1853	Acland, Sir Peregrine Palmer F. P., Bart. <i>Fairfield, Somerset.</i>
1830	*Acland, Sir Thomas Dyke, Bart., F.R.S. <i>Waterloo-hotel, Jermyn-street, S.W.; and Killerton, Exeter, Devon.</i>
1859	Ainslie, Col. Francis H. <i>Junior United Service Club; and Burlington Chambers, 180, Piccadilly, W.</i>
1830	*Ainsworth, William Francis, Esq., F.S.A. <i>Ravenscourt-villa, New-road, Hammersmith, W.</i>
1857	Airey, John Moore, Esq.
1859	Airlie, David Graham, Earl of. <i>27, Berkeley-square, W.</i>
1830	*Albemarle, George Thomas, Earl of. <i>36, Great Cumberland-place, W.; Quid-denham-hall, Larkingford, Norfolk; and Elvedon-hall, Suffolk.</i>
1834	10*Alcock, Thomas, Esq., M.P. <i>95, Park-street, W.; and Kingswood-warren, near Epsom, Surrey.</i>
1838	*Aldam, William, Esq. <i>Frickley-hall, near Doncaster.</i>
1857	Aldrich, Commander Robert D., R.N. <i>H.M.S. 'Waterloo,' Sheerness.</i>
1830	Alexander, Colonel Sir Jas. Ed., K.L.S., F.R.A.S., etc., 14th Regt. <i>United Service Club, S.W.; and Fermoy, Ireland.</i>
1857	Alexander, M. Genl., R.A. <i>Blackheath-park, S.E.</i>
1855	Alger, John, Esq. <i>16, Oakley-square, N.W.</i>
1857	Allan, George W., Esq. <i>Toronto, Canada.</i>
1858	Allan, Jas., Esq. <i>122, Leadenhall-street, E.C.</i>
1835	*Allen, Capt. Wm., R.N., F.R.S. <i>Athenæum Club, S.W.; and 7, Russell-st., Bath.</i>
1859	Alsager, Thos. H., Esq. <i>Reform Club, S.W.; and Chislehurst, Kent.</i>
1854	20 Ancona, J. S., Esq. <i>8, John-street, Adelphi, W.C.</i>
1856	*Andrew, William P., Esq. <i>26, Montagu-square, W.</i>
1853	Ansted, Prof. D. T., M.A., F.R.S., etc. <i>Athenæum Club, S.W.; and Bonair St. Martin, Guernsey.</i>
1857	Anstruther, Lt.-Col. Philip, C.B. <i>Madras Artillery, 1, Chapel-st., Grosvenor-place, S.W.</i>
1830	*Antrobus, Sir Edmund, Bart. <i>146, Piccadilly, W.; Lower Cheam, Epsom, Surrey; and Amesbury, Wilts.</i>
1857	Arbuthnot, Coutts T., Esq.
1858	Arbuthnot, George, Esq. <i>23, Hyde-park-gardens, W.</i>



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- 1855 \*Arden, Richard Edward, Esq. *Sunbury-park, Middlesex, S.W.*
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- 1830 \*Arrowsmith, John, Esq., F.R.A.S. 10, *Soho-square, W.*
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- 1858 Atkinson, Thomas W., Esq. *Hawk-cottage, Old Brompton, S.W.*
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- 1854 Ayrton, Acton S., Esq., M.P. 24, *Grafton-street, Bond-street, W.*
- 1845 \*Ayrton, Frederick, Esq. *Egypt.*
- 1857 Aytoun, R. Sinclair, Esq. *Inchdairnie, Fife.*
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- 1839 Baikie, Robert, Esq., M.D. *Oriental-Club, W.*
- 1855 Baikie, Wm. Balfour, Esq., M.D., R.N. *Niger Expedition. Brunswick-cottage, Forton-road, Gosport.*
- 1850 Bailey, L. C., Esq., R.N. *Ordnance Office.*
- 1834 \*Baillie, David, Esq., F.R.S. 14, *Belyrave-square, S.W.; and Mill-park, Surrey.*
- 1857 Baillie, Capt. John, 26th Bengal Native Infantry. 14, *St. James's-square, S.W.*
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- 1850 Bainbridge, Joseph, Esq. 21, *Hyde-park-gardens, W.*
- 1857 †Baines, Thomas, Esq. *Livingstone Expedition; and 14, Union-street, Lynn Regis.*
- 1830 \*Baker, Colonel G. 31, *Grosvenor-place, Bath.*
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- 1837 \*Bateman, James, Esq., F.R.S., L.S. *Knypersley-hall, Staffordshire.*
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- 1830 Becher, Capt. Alex. B., R.N. *Admiralty, S.W.; and 29, Upper Gloucester-place, N.W.*
- 1838 80\*Beckford, Francis, Esq. *Travellers' Club.*
- 1854 Bedford, Commander Edward James, R.N. *Oban, N.E.*
- 1855 Beddingfeld, Commander Norman B., R.N. 15, *Surry-street, Strand, W.C.*
- 1846 Beke, Charles Tilstone, Esq., PH. DR., F.S.A., &c. *Mauritius; and 15, Philpot-lane, E.C.*
- 1853 Belcher, Rev. Brymer. *St. Gabriel's, Pimlico, S.W.*
- 1830 \*Belcher, Capt. Sir Edward, C.B., F.R.A.S., R.N. *Union Club, S.W.*
- 1858 Belham, Edward, Esq. *Lincoln's-inn, W.C.; and Royston, Herts.*
- 1848 Belham, Joseph, Esq. *Royston, Herts.*
- 1850 \*Bell, James, Esq. 1, *Devonshire-place, Portland-place, W.*
- 1830 \*Bell, James Christian C., Esq. 42, *Westbourne-terrace, W.; and 15, Angel's court, Throgmorton-street, E.C.*
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- 1857 Bennett, J. Risdon, Esq., M.D. 15, *Fausbury-square, E.C.*
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- 1856 \*Benson, William, Esq., Barrister-at-Law. 6, *Lincoln's-inn, W.C.; and Oxford and Cambridge Club, Pall Mall, S.W.*
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- 1854 \*Bristol, William Henry, Esq., Lieut. R.N., M.R.I. *Junior United Service Club, S.W.; and 15, Camden-place, Bath.*
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- 1850 Broughton, John, Lord, G.C.B., M.A., F.R.S. 42, *Berkeley-square, W.*; and *Erlestoke-park, Westbury, Wilts.*
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- 1859 Brown, William, Esq. *Loat's-road, Clapham-park, S.*
- 1858 Browne, John H., Esq. *Port Gawler, S. Australia.*
- 1858 Browne, William J., Esq. *Port Gawler, S. Australia.*
- 1852 Browning, Henry, Esq., M.R.I. 72, *Grosvenor-street, W.*; and *Ampton-hall, Bury St. Edmund's.*
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- 1839 Bunbury, E. H., Esq., M.A. 15, *Jermyn-street, S. W.*
- 1858 Burmester, Edward, Esq. *St. Helen's-place, E.C.*; and *Springwell, Clapham-common, S.*
- 1830 \*Burney, Ven. Archd. Charles Parr, D.D., F.R.S., F.S.A. *Rectory-house, Bishop's Wickham, Essex.*
- 1857 Burstall, Commander E., R.N. 6, *Park-villas, Lower Norwood, S.*
- 1830 190\* Burton, Alfred, Esq. 36, *Marina, St. Leonard's.*
- 1833 \*Burton, Decimus, Esq., F.R.S. 6, *Spring-gardens, S. W.*; and *St. Leonard's-cottage, Hastings.*
- 1859 \*Burton, Capt. Richd. Fcs., 18th Regt. Bombay N.I. 14, *St. James's-square, S. W.*
- 1858 Bury, William Coutts, Viscount, M.P. 47, *Sloane-street, S. W.*
- 1858 \*Buxton, Sir Thomas Fowell, Bart. *Brick-lane, N.E.*
- 1851 Bynoe, Benjamin, Esq., Surgeon R.N.
- 1834 Byron, the Hon. Frederic. 48, *Latou-place, S. W.*; and *Langford, Mulkon, Essex.*
- 1830 \*Cabbell, B. B., Esq., M.A., F.R.S., F.S.A. 1, *Brick-court, Temple, E.C.*; 52, *Portland-place, W.*; and *Albriek, Sussex.*
- 1857 \*Caldwell, Capt. Henry, R.N. *H.M.S. 'Mersey,' Portsmouth*; and 3, *Audley-square, W.*
- 1855 \*Calthorpe, the Hon. F. H. Gough, M.P. 33, *Grosvenor-square, W.*
- 1854 200 Calvert, Frederic, Esq., Q.C. 9, *St. James's-place, S. W.*; and 8, *New-square, Lincoln's-inn, W.C.*

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Election.

- 1830 \*Camden, George Charles, Marquis, K.G., D.C.L., M.A. *Wilderness-park, Sevenoaks, Kent; and Bayham-abbey, Sussex.*
- 1858 Cameron, Major-General Duncan Alexander, R.E., C.B., Vice-Pres. Council of Military Education. 1, *Whitehall-yard, S. W.*
- 1858 Cameron, Capt. Charles D. *Vice-Consul, Redout Kalé, Mingrelia.*
- 1844 \*Campbell, James, Esq.
- 1857 †Campbell, James, Esq., Surgeon, R.N. *Bangkok, Siam; and Luss, Dumbartonsh.*
- 1834 \*Campbell, James, Esq., jun., M.R.I. *Hampton Court-green, S. W.*
- 1857 Camps, William, Esq., M.D. 40, *Park-street, Grosvenor-square, W.*
- 1857 Cannon, Lieut.-General P. 10, *Kensington-gardens-terrace, Hyde-park, W.*
- 1853 \*Cardwell, Right Hon. Edward, M.P. 74, *Eaton-square, S. W.*
- 1857 210 Carnarvon, Henry Earl of. *Highclere-castle, near Newbury.*
- 1857 Cartwright, Cornwallis R., Esq. *Walton-on-Thames, Surrey.*
- 1857 Cartwright, Colonel Henry, Grenadier Guards, M.P. 46, *Park-st., Grosvenor-sq., W.*
- 1830 \*Cartwright, Samuel, Esq., F.R.S., F.S.A. 32, *Old Burlington-street, W.; and Nizell's-house, Tonbridge.*
- 1858 Casella, Lucius P., Esq. 23, *Hutton-gln., E.C.; and South-grove, Highgate, N.*
- 1857 Cave, Capt. Laurence Trent. 23, *Loundes-street, Belgrave-square, S. W.*
- 1858 Cave, Stephen, Esq., M.P. 23, *Wilton-place, S. W.*
- 1844 \*Chadwick, Hugo Mavesyn, Esq. *New Hall, near Sutton-Coldfield.*
- 1857 Chalmers, Alexander Thomson, Esq., M.D.
- 1858 Champion, John Francis, Esq. 9, *Canterbury-villas, Brixton, S.*
- 1855 220 Chapman, John, Esq. 124, *Pall Mall, S. W.; and 2, Leadenhall-street, E.C.*
- 1834 \*Chapman, Capt. John James, R.A. *Cestilian-street, Northampton.*
- 1840 Charters, Major Samuel, R.A. *Athenæum Club, S. W.; and 3, Bedford-street, James-square, Bath.*
- 1855 Cheshire, Edward, Esq. *Conservative Club, St. James's-street, S. W.*
- 1838 \*Chesney, Major-General Francis Rawdon, R.A., D.C.L., F.R.S. *Athenæum Club, S. W.; and Ballyardle, Kilkeel, Down, Ireland.*
- 1858 Chesney, Capt. C. Cornwallis, R.E. *Prof. Military History, R. M. College, Southurst.*
- 1853 Chetwoode, Augustus L., Esq. 2, *Little Ryder-street, S. W.; and Chilton House, Thame, Oxfordshire.*
- 1858 Childers, Hugh C. E., Esq. *Little Bond, Tunbridge Wells; and Australia.*
- 1856 Childers, John Walbanke, Esq. *Cantley Hall, near Doncaster.*
- 1857 \*Chimmo, Lieut. William, R.N. *H.M.S. 'Seagull,' Scotland; and Admiralty, S. W.*
- 1850 230 Christmas, Rev. H., M.A., D.C.L., F.R.S., F.S.A. 30, *Manor-street, Clapham, S.*
- 1854 Christy, Henry, Esq. *Woodbines, near Kingston, Surrey, S. W.*
- 1854 \*Church, John Wm., Esq., B.A. *United University Club, S. W.; and Woodside, Hatfield.*
- 1830 \*Church, W. H., Esq.
- 1849 Churchill, Lord Alfred Spencer, M.P. 16, *Rutland-gate, S. W.*
- 1856 Churchill, Charles, Esq. 29, *Sussex-square, Hyde-park, W.*
- 1853 Clarendon, George William, Earl of, K.G., G.C.B. 1, *Grosvenor-crescent, S. W.; The Grove, Watford, Herts; and Hindon, Wilts.*

## List of Fellows of the

Year of  
Election.

- 1852 Clark, Daniel, Esq. 49, *Milner-square, Islington; N.*
- 1840 \*Clark, Sir James, Bart., M.D., F.R.S. 22 b, *Brook-street, W.*
- 1851 Clark, Rev. Samuel, M.A. *Principal of the Training College, Battersea, S.W.*
- 1859 240 Clarke, Capt. A., R.E. *Army and Navy Club, S.W.*
- 1859 Clarke, Samuel, Esq., C.E. *Ipswich.*
- 1855 \*Clarke, Rev. W. B., M.A. *St. Leonard's, Sydney, New South Wales.*
- 1859 Clarke, Rev. W. Geo., M.A. *Trinity College, Cambridge.*
- 1842 \*Clavering, Sir William Aloysius, Bart. *United University Club, Pall-Mall East, S.W.; and Arxell-park, near Gateshead.*
- 1830 \*Clerk, Rt. Hon. Sir George, Bart., D.C.L., F.R.S., &c. *Pennicuik-house, Edinburgh.*
- 1858 Clermont, Thomas, Lord. *Ravensdale-park, Flurry-bridge, Ireland.*
- 1858 Clifford, Charles Cavendish, Esq., M.P. 92, *Eaton-square, S.W.*
- 1856 Clive, Rev. Archer. *Whitfield, Hereford.*
- 1854 Clowes, George, Esq. *Duke-street, Stamford-street, Blackfriars, S.; and 89, Westbourne-terrace, W.*
- 1854 250 Clowes, William, Esq. 31; *Gloucester-terrace, Hyde-park, W.; and Banstead, Surrey.*
- 1852 Cobbold, John Chevallier, Esq., M.P. *Athenæum Club, S.W.; and Ipswich, Suffolk.*
- 1841 \*Cocks, Reginald T., Esq. 43, *Charing-cross, S.W.; and 22, Hertford-street, May-fair, W.*
- 1857 Coghlan, Edward, Esq. *Training Institution, Gray's-inn-road, W.C.*
- 1838 Colchester, Charles, Lord, Rear-Admiral, D.C.L. 34, *Berkeley-square, W.; and Kidbrooke, Sussex.*
- 1853 Cole, John Griffith, Esq., M.A., M.R.I. 8, *Charles-street, Berkeley-square, W.*
- 1841 \*Colebrooke, Sir Thomas Edward, Bart., M.P., F.R.A.S. 18, *Park-lane, W.*
- 1834 Colebrooke, Lt.-General Sir Wm., R.A., M.G., C.B., K.H., F.R.A.S. *Datchet, near Windsor; and United Service Club, S.W.*
- 1854 Coleman, Everard Home, Esq., F.R.A.S. *Registry and Record Office, Adelaide-place, London Bridge, E.C.*
- 1848 Coles, Charles, jun., Esq. 86, *Great Tower-street, E.C.*
- 1835 260 \*Collett, William Rickford, Esq.
- 1858 Collinson, Henry, Esq. 8, *Delamere-street, Paddington, W.*
- 1855 Collinson, Captain Richard, C.D., R.N. *Haven-lodge, Ealing, W.; and United Service Club, S.W.*
- 1843 \*Cook, James, Esq. 40, *Mincing-lane, E.C.; and 47, Portland-place, S.W.*
- 1859 Cooke, Major A. C., R.E. *Topographical Department, 4, New-street, Spring-gardens, S.W.*
- 1856 Cooke, John George, Esq. *Martin and Co., Lombard-street, E.C.*
- 1852 Cooke, Robert, Esq. 50, *Albemarle-street, W.; and 38, Nottingham-pl., New-road, W.*
- 1830 Cooley, William Desborough, Esq. 10, *Portman-street, Portman-square, W.*
- 1843 \*Cooper, Capt. D. S., 1st Royal Regt. *Army and Navy Club, S.W.*
- 1856 Cooper, Lt.-Col. Edward, Grenadier Guards. 36, *Hertford-street, W.*
- 1853 270 Coote, Charles Chidley, Esq. C4, *Albany; and Mount-Coote, Limerick, Ireland.*
- 1857 Coote, Captain Robert, R.N. *Oroca-lodge, Oroca, Wicklow.*

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- 1853 Copley, Sir Joseph William, Bart. *Sprotborough, Doncaster.*
- 1839 \*Corrance, Frederick, Esq. *Parkham-hall, Wickham Market, Suffolk.*
- 1856 Costerton, John C., Esq. *Canton.*
- 1853 \*Cosway, William Halliday, Esq. *Oxford and Cambridge Club, S.W.*
- 1857 \*Cowell, Major J. C., R.E. *Buckingham-palace, S.W.*
- 1854 Cowley, Norman, Esq. 4, *Montagu-place, Montagu-square, W.*
- 1859 Cracroft, Major Henry. *Upton Villas, Hoven-green, Ealing, W.*
- 1853 \*Cracroft, Captain Peter, R.N. *H.M.S. 'Niger,' Australia.*
- 1858 280 Cranbourne, James, Viscount. 20, *Arlington-street, S.W.*
- 1853 Craufurd, Captain Frederic A. B., R.N. *Senior United Service Club, S.W.*
- 1857 Craufurd, Major-General James R. Cabe, Grenadier Guards. *Travellers' Club, S.W.; and Sunning-hill, Chertsey.*
- 1857 Crawford, James, Esq. *Brussa, Turkey; and Strathleven, Dumbartonshire, N.B.*
- 1848 Crawford, Robert Wigram, Esq., M.P. 71, *Old Broad-street, E.C.*
- 1830 Craufurd, John, Esq., F.R.S. *Athenæum Club, S.W.; and 4, Eaton-place West, S.W.*
- 1854 \*Creswell, Captain S. Gurney, R.N. *Lynn, Norfolk.*
- 1859 Creyke, Commander R. Boynton, R.N. *Oban, N.B.*
- 1856 Croker, T. F. Dillon, Esq. 6, *Strand, W.C.*
- 1852 Crowdy, James, Esq. 17, *Serjeants'-inn, E.C.*
- 1839 290 \*Cubitt, Sir William, F.R.S., C.E. 19, *Great George-street, Westminster, S.W.; and Clapham-common, Surrey, S.*
- 1844 \*Cubitt, Mr. Alderman William, M.P. *Gray's-inn-road, W.C.; and 21, Abchurch-lane, E.C.*
- 1857 Cumming, William F., Esq., M.D. *Athenæum Club, S.W.; and Athol-crescent, Edinburgh.*
- 1847 \*Cunard, Edward, Esq. *New York.*
- 1846 Cunard, Sir Samuel, Bart. *Houchin's Hotel, St. James's-street, S.W.*
- 1838 \*Cunningham, George Godfrey, Esq. *Windermere, Westmoreland.*
- 1859 Cunningham, H. D. P., Esq., R.N. *Bury, near Gosport, Hants.*
- 1853 Cunningham, John Wm., Esq., Sec. King's College. *Somerset-house, W.C.; and Harrow.*
- 1843 \*Cursetjee, Manockjee, Esq., F.R.S.N.A. *Villa-Byculla, Bombay.*
- 1839 \*Curtis, Timothy, Esq.
- 1857 300 Dalton, D. Foster Grant, Esq. *Parkstone, near Poole; and Shanks House, near Somerset.*
- 1851 \*Daniell, William Freeman, Esq., M.D., F.L.S. 17, *Charles-street, St. James's-square, S.W.*
- 1838 \*Darwin, Charles, Esq., M.A., V.P.R.S. *Athenæum Club, S.W.; and Down, near Bromley, Kent.*
- 1859 Davies, William, Esq. 3, *Corbett-court, Gracechurch-street, E.C.*
- 1858 Davis, Francis William, Assist.-Surgeon, R.N. *Royal Hospital, Greenwich, S.E.; and Lurganboy House, Manor Hamilton, Ireland.*



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- 1846 Davis, Sir John Francis, Bart., K.C.B., F.R.S., F.R.S.N.A. *Athenæum Club, S. W.; and Hollywood, near Bristol, Gloucestershire.*
- 1855 Davis, Rev. Nathaniel. *Tunis.*
- 1840 \*Dawnay, the Hon. Payan. *Beningborough-hall, Yorkshire.*
- 1830 \*Dawson, Lieut.-Col. R. K., R.E. *Copyhold Enclosure and Tithe Commission, 3, St. James's-square, S. W.*
- 1859 De Blaquiere, John, Lord. 16, *Norfolk-street, Park-lane, W.*
- 1852 310 De Boinville, Chev. Alexander, K.L.H. *Westborough House, Maidstone.*
- 1858 De Bourgho, J. T., Esq. *Orchardfield, Leith-walk, Edinburgh.*
- 1856 De Crespigny, Lieut. C. A. C., R.N. 8, *Connaught-place, Hyde-park, W.; and Borneo.*
- 1856 De Gex, William Francis, Esq. 8, *Serle-street, Lincoln's-inn, W.C.*
- 1842 \*De Grey, Thomas Philip, Earl, F.S.A., F.R.A.S. 4, *St. James's-square, S. W.; Newby-hall, Boroughbridge; and West-park, Silsoe, Beds.*
- 1859 De la Motte, Lieut.-Gen. Peter, C.B. 15, *Craven-hill-gardens, Bayswater, W.*
- 1854 De la Rue, William Frederick, Esq. 110, *Bunhill-row, Chiswell-street, E.C.*
- 1834 \*Denison, His Excellency Sir William Thomas, Lieut.-Col. R.E., F.R.S. *Governor-General of Australia.*
- 1836 Denman, Capt. the Hon. Joseph, R.N. 17, *Eaton-terrace, S. W.; and H.M. Yacht.*
- 1833 \*Derby, Edward Geoffrey, Earl of, P.C., F.L.S. 23, *St. James's-square, S. W.; and Knowsley-park, Prescott, Lancashire.*
- 1837 320 De Ros, Rear-Admiral the Hon. J. F. Frederick, F.R.S. 122, *Piccadilly, W.*
- 1854 \*Devaux, Alexander, Esq. 2, *Avenue-road, Regent's-park, N. W.*
- 1837 \*Devonshire, William Cavendish, Duke of, LL.D., M.A., F.R.S. *Devonshire House, Piccadilly, W.; and Harwick Hall, Derbyshire.*
- 1833 Dickenson, John, Esq., F.R.S., F.S.A. 39, *Upper Brook-street, W.; and Abbott's-hill, Hemel-Hempstead.*
- 1852 \*Dickenson, John, Esq., jun. *Clarence Chambers, 12, Haymarket, S. W.; and Abbott's-hill, Hemel-Hempstead.*
- 1854 Dickenson, Sebastian Stewart, Esq., Barrister-at-Law. *Brown's-hill, Stroud, Gloucestershire.*
- 1844 Dickenson, Major-Gen. Thomas, Bom. Eng., F.R.A.S. *Lower Tulse-hill, Norwood, S.*
- 1830 \*Dickinson, Francis Henry, Esq., F.S.A. 8, *Upper Harley-street, W.; and Kingston-park, Somerset.*
- 1859 Dickson, A. Benson, Esq. 19, *Old-square, Lincoln's-inn, W.C.*
- 1858 Dickson, Charles Hammer, Esq. *H.M. Consul, Sûkum Kale, Black Sea.*
- 1836 330 Dickson, George Frederick. 20, *Hanover-terrace, Regent's-park, N. W.*
- 1843 Dickson, Peter, Esq. 28, *Upper Brook-street, W.*
- 1836 \*Dilke, Charles Wentworth, Esq. 76, *Sloane-street, S. W.*
- 1845 \*Dilke, Charles Wentworth, Esq., jun. 76, *Sloane-street, S. W.*
- 1859 \*Dilke, Charles Wentworth. 76, *Sloane-street, S. W.*
- 1856 Dillon, the Hon. Arthur. 17, *Charges-street, W.*
- 1840 \*Divett, Edward, Esq., M.P. 97, *Eaton-square, S. W.; and Bystock, near Exmouth, Devon.*

Year of Election	
1854	Dixon, Wm. Hepworth, Esq., F.S.A. <i>Essex Villa, Queen's-road, St. John's-wood, N.W.</i>
1857	Dobie, John, Esq., R.N. <i>Junior United Service Club; and Club Chambers, S.W.</i>
1857	Dobie, Robert, Esq., M.D., R.N. 7, <i>Houghton-place, Amptill-sq., Hampstead-road, N.W.</i>
1841	340 *Dodd, George, Esq., F.S.A. 9, <i>Grosvenor-place, S.W.</i>
1854	Dodson, John George, Esq., M.P. 40, <i>Upper Seymour-st., Portman-square, W.</i>
1854	*Dollond, George, Esq. <i>St. Paul's Churchyard, E.C.</i>
1854	Domville, William T., Esq., R.N., M.D. <i>Army and Navy Club, S.W.</i>
1836	Donaldson, Rev. J. W., D.D., F.R.A.S. <i>Athenæum Club, S.W.; and Bury St. Edmunds.</i>
1853	Donaldson, Stuart, Esq. 22, <i>Rutland-gate, S.W.; and Sydney, Australia.</i>
1834	Donkin, Henry, Esq.
1858	Donne, John, Esq. 2, <i>Portis-head, Bloomsbury, W.C.</i>
1850	Dover, John William, Esq. 124, <i>Fenchurch-street, E.C.</i>
1854	Dower, John, Esq. 168, <i>Pentonville-road, N.</i>
1853	350 Doyle, Sir Francis Hastings C., Bart. <i>Custom House, E.C.</i>
1845	*Diach, Solomon Moses, Esq., F.R.A.S. 23, <i>Walpole-st., King's-rd., Chelsea, S.W.</i>
1846	Drummond, Lieut.-General John. <i>The Boyce, Dymock, Gloucestershire.</i>
1846	Dunry, Capt. Byron, R.N. <i>Grove-road, Southsea.</i>
1851	*Duane, Major Francis, R.E. 64, <i>Londes-square, S.W.</i>
1851	*Ducie, Henry John, Earl of, F.R.S. 30, <i>Princes-gate, S.W.</i>
1839	Ducket, Clark A., Esq., Assist.-Surg. R.N. <i>Royal Hospital, Haslar.</i>
1837	Dufferin, Frederick Temple, Lord. <i>Dufferin Lodge, Highgate, N.; and Clarendon-house, Belfast.</i>
1840	*Dundas, Right Hon. Sir David, Q.C. 13, <i>King's-Bench-walk, Temple, E.C.; and Ochertyre, Co. Perth.</i>
1830	*Dundas, Vice-Admiral the Hon. Sir Richard Saunders, K.C.B. 13, <i>New-street, Spring-gardens, S.W.</i>
1850	360 Dunlop, A. Graham, Esq. <i>Attache to H.M.'s Legation, Clary Palace, Vienna; and Wyndham Club.</i>
1837	*Dunraven, Edwin Richard, Earl of, F.R.S. <i>Adare-manor, Limerick; and Dunraven-castle, Glamorganshire.</i>
1856	Dupiat, Chevalier Alfredo. <i>H.M.F. Arbitrator, Cape Town, Cape of Good Hope.</i>
1852	D'Urban, Colonel W. J. <i>Deputy Quartermaster-General, Canada; and Junior U. S. Club, S.W.</i>
1858	Eardley, Sir Culling E., Bart. <i>Bebulcre, Erith.</i>
1837	Eardley, Rev. E. G. Culling. <i>Teston-rectory, Maulstone.</i>
1854	Eardley-Wilmot, Capt. A. P., R.N., C.B. <i>H.M.S. 'Nab,' Queenstown.</i>
1856	Eardley-Wilmot, Colonel F., M.R.A. <i>Director of the Cannon Foundries, Woolwich, S.E.</i>
1857	Eastwick, Captain W. J. 12, <i>Leinster-terrace, Hyde-park, W.</i>
1844	*Ebrington, Hugh, Viscount. 17, <i>Bruton-street, W.; and Castle-hill, South Molton, Devon.</i>

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- 1858 170 Edge, Rev. W. J., M.A. *Benenden Vicarage, near Staplehurst, Kent.*
- 1857 Egerton, Commander Charles Randell, R.N. 7, *Rutland-gate, S.W.*
- 1853 Egerton, Captain the Hon. Francis, R.N. *Bridgewater-house, S.W.; and H.M.S. 'Royal Albert.'*
- 1859 Elgin and Kincardine, James Bruce, Lord, G.C.B. 20, *Chesham-place, S.W.; and Broom Hall, Dunfermline.*
- 1843 Ellenborough, Edward, Earl of, G.C.B. 108, *Eaton-square, S.W.; and Southam-house, near Cheltenham.*
- 1855 Ellesmere, George Granville Francis, Earl of, &c. &c. *Bridgewater-house, Cuckfield-square, S.W.; and Worsley-hall, Lancashire.*
- 1830 \*Elliott, Rev. Charles Boileau, M.A., F.R.S. 47, *Portland-place, W.; and Tuttonstone, Suffolk.*
- 1855 †Elliott, Christopher, Esq., M.D. *Columbo, Ceylon.*
- 1857 Ellis, John Uthay, Esq. *The Barches, Hingley, Stowbridge.*
- 1858 Elphinstone, Captain Howard, R.E. *Buckingham Palace, S.W.*
- 1830 380\* Elphinstone, the Hon. Mount-Stuart, F.R.A.S., F.R.S.N.A. *Athenæum Club, S.W.; and Heddon, Loughfield, Surrey.*
- 1857 Elton, Sir Arthur H., Bart. *Athenæum Club, S.W.; and Clevedon Court, Somersetshire.*
- 1840 Enderby, Charles, Esq., F.R.S., F.L.S. 13, *Great St. Helen's, E.C.*
- 1850 Entwisle, John, Esq. 1, *Russell-square, W.C.*
- 1852 Eskine, Rear-Admiral John Elphinstone, C.B. 11, *Albany, W.; and Curdross, Stirling, N.B.*
- 1857 \*Esmeale, G. M. M., Esq. 29, *Park-street, Grosvenor-square, W.*
- 1850 Espinasse, Capt. J. W., 12th Regt. *Cox and Co., Craig's-court, S.W.*
- 1851 Evans, Rev. Charles. *Rugby.*
- 1857 Evans, Frederic J., Esq., R.N., F.R.A.S. 4, *Wellington-terrace, Charlton, Blackheath, S.E.*
- 1830 \*Evans, Rear-Admiral George. 1, *New-street, Spring-jardens, S.W.; and Englefield-green, Chertsey.*
- 1857 390 Evans, Thomas William, Esq., M.P. 7, *Stratford-place, W.; and Allestree Wall, Derby.*
- 1830 \*Evans, W. Esq.
- 1851 \*Evelyn, William J., Esq., F.S.A. *Wotton-house, near Dorking.*
- 1845 \*Everest, Col. Geo., Bengal Art., F.R.S., &c. 10, *Westbourne-st., Hyde-park, W.*
- 1830 \*Everett, James, Esq.
- 1859 Ewart, William, Esq., M.P. 6, *Cambridge-square, W.*
- 1839 Ewer, Walter, Esq., F.R.S., F.L.S. 8, *Portland-place, W.*
- 1856 Ewing, J. D. Crum, Esq.
- 1857 Eyre, Edward J., Esq., Lieut.-Governor of Antigua.
- 1850 †Eyre, Col. Vincent, C.B. *Athenæum Club, S.W.; and India.*
- 1857 400 Faddy, Lieut.-Colonel P. P., R.A. *Park End, Sydenham, S.E.*
- 1855 Fagun, Lieut.-Col. C. G., Bengal Army. *Gresham-house, Old Broad-street, E.C.*
- 1857 Fairbairn, Lieutenant Charles, R.N. *H.M.S. 'Meyera' and York-terrace, Portsmouth.*
- 1856 Fairbairn, George Knight, Esq. *Union Club; and Ravenswood, Melrose, N.B.*

Year of  
Election.

- 1838 Falconer, Thomas, Esq. *Ush, Monmouthshire.*
- 1857 Falkland, Lucius Bentinck, Viscount. *Skutterskelfe, Yorkshire.*
- 1855 \*Fanshawe, Capt. E. G., R.N. 27, *Rutland-gate, Hyde-park, S.W.*
- 1854 Farmer, William Francis Gamul, Esq. *Nonsuch-park, Surrey.*
- 1857 Farrer, Thomas H., Esq. *Board of Trade, S.W.; and 21, Chester-terrace, Regent's-park, N.W.*
- 1853 \*Fayrer, Joseph, Esq., M.D. 15, *Surrey-street, Strand, W.C.*
- 1858 410 Fazakerley, J. N., Esq. 17, *Montagu-street, Portman-square, W.*
- 1838 \*Fellows, Sir Charles. 4, *Montagu-place, Russell-square, W.C.; Cowes, Isle of Wight; and Leeston, Nottinghamshire.*
- 1856 Ferguson, Rev. Robert, LL.D., F.S.A. *St. Alban's Villa, Ryde, Isle of Wight.*
- 1856 Ferguson, William, Esq. 31, *Torrington-square, W.C.; and Gresham-house, 62, Old-Broad-street, E.C.*
- 1840 \*Fergusson, James, Esq., F.R.A.S. 20, *Longham-place, W.*
- 1830 Findlay, Alexander, Esq. 53, *Fleet-street, E.C.; and Hayes, Kent, S.E.*
- 1844 Findlay, Alex. George, Esq. 53, *Fleet-street, E.C.*
- 1859 Fisher, Anthony L., Esq., M.D. 14, *York-place, Baker-street, Portman-square, W.*
- 1859 Fisher, Robert, Esq. 46 1, *Pall-mall, S.W.*
- 1830 \*Fitton, Wm. Henry, Esq., M.D., F.R.S., F.L.S. *Athenæum Club, S.W.; and 4, Sussex-gardens, Hyde-park, W.*
- 1857 420 \*Fitzclarence, Lieut. Hon. George, R.N. 1, *Addison-road, Kensington, W.*
- 1859 Fitz-Roy, George Henry, Esq. 51, *Portland-place, W.*
- 1830 Fitz-Roy, Rear-Admiral Robert, F.R.S. *Board of Trade; Athenæum Club, S.W.; and 38, Onslow-sq., Brompton, S.W.*
- 1857 Fitzwilliam, the Hon. C. W., M.P. *Mortimer House, Halkin-street, S.W.*
- 1853 \*Fleming, Rev. Francis. *Kilmore End, Henley-on-Thames.*
- 1857 Fletcher, Thomas K., Esq. *Union-dock, Limehouse, E.*
- 1847 Forrester, Joseph J., Esq., F.S.A. 24, *Crutchford Friars, E.C.; and Oporto.*
- 1845 Forster, Rev. Charles, B.D. *Stisted Rectory, Essex.*
- 1839 \*Forster, William Edward, Esq. *Burley, near Otley.*
- 1858 Fortescue, Chichester S., Esq., M.P. 45, *St. James's-place, S.W.*
- 1841 430 \*Fowler, Rear-Admiral Robert M. *Williscote-house, Pangbourne.*
- 1850 \*Fowler, Robert N., Esq., M.A. 50, *Cornhill, E.C.; and Tottenham, N.*
- 1830 \*Fox, Lieut.-Gen. Charles R. *Travellers' Club, S.W.; and 1, Addison-road, Kensington, W.*
- 1859 Fox, Lieut.-Col. A. Lane. *Park-hill, Clapham, S.*
- 1854 Fraser, Charles, Esq. 38, *Conduit-street, W.*
- 1830 Fraser, Major-General John, R.E. *Deputy Quartermaster-General, Ceylon.*
- 1859 Freeman, H. Stanhope, Esq. *Vice-Consul, Gbadames.*
- 1856 Fremantle, Rt. Hon. Sir Thomas F., Bart. 4, *Upper Eccleston-street, Belgrave-square, S.W.*
- 1852 French, Dr. James, C.B. *Inspector-General of Hospitals, Graham's Hotel, Edinburgh.*
- 1850 Frere, Bartle J. L., Esq. 45, *Bedford-square, W.C.*
- 1850 440 \*Frere, George, Esq., jun. *Cape of Good Hope; and 45, Bedford-square, W.C.*

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- 1842 Frere, William Edw., Esq., F.R.A.S. *Bombay*; and 45, *Bedford-square, W.C.*
- 1853 Frith, John Griffith, Esq. 13, *Wimpole-street, W.*; and 11, *Austin Friars, E.C.*
- 1855 Fuller, J., Esq. *Stevens' Hotel, Bond-street, W.*
- 1855 \*Gabriel, Edmund, Esq. *H.M.'s Arbitrator, St. Paul de Loando*; and 1, *Jones-street, Adelphi, W.C.*
- 1845 \*Gage, Admiral Sir William Hall, G.C.H., K.C.B. *Thurston Cottage, Bury St. Edmund's, Suffolk.*
- 1855 \*Galloway, John James, Esq. 14, *Trinity-square, Tower-hill, E.C.*
- 1848 \*Galton, Capt. Douglas, R.E. *Board of Trade, S.W.*; and 12, *Chester-street, Grosvenor-place, S.W.*
- 1850 \*Galton, Francis, Esq., M.A. 42, *Rutland-gate, S.W.*; and 5, *Bertie-terrace, Leamington.*
- 1854 \*Gammell, Andrew, Esq. *Drumtochty, Kincardineshire, N.B.*
- 1843 450 Gascoigne, Capt., Ceylon Rifles. *Athenæum Club, S.W.*
- 1858 Gaussin, William, Esq. 12, *Montagu-place, Russell-square, W.C.*
- 1858 \*Gawler, Colonel George, K.H. *United Service Club, S.W.*
- 1840 \*Gibbes, Charles, Esq. 24, *Covenish-square, W.*
- 1855 Gifford, George, Earl of, M.P. 2, *Wilton-street, Grosvenor-place, S.W.*
- 1857 Gilchrist, John, Esq. 48, *Porchester-terrace, W.*
- 1855 Gillespie, Alexander, Esq. 38, *Gordon-square, W.C.*
- 1857 Gillespy, Thomas, Esq. *Brabant-court, Philpot-lane, E.C.*
- 1857 Gilmore, Lieut. A. H., R.N. *H.M.S. 'Revenant,' Channel Squadron.*
- 1852 Gisborne, Lionel, Esq., C.E. 6, *Duke-street, Adelphi, W.C.*
- 1846 460 Gladdish, William, Esq. *Ryeholme, Gravesend.*
- 1846 \*Gladstone, William, Esq. 57½, *Old Broad-street, E.C.*
- 1857 Gleig, Rev. G. R., M.A. *Chaplain-General, Chelsea-hospital, S.W.*
- 1854 Glen, Joseph, Esq., M.D., Mem. Geogr. Soc. of Bombay. *Oriental Club, W.*
- 1857 Glennie, John Stuart, Esq., F.S.A., Barrister-at-law. *Reform Club, S.W.*; and 6, *Stone Buildings, Lincoln's-inn, W.C.*
- 1857 Glover, Lieut. John H., R.N. *Niger Expedition*; and *Army and Navy Club, S.W.*
- 1858 Glyn, Pascoe Charles, Esq. *Gresham-house, 62, Old Broad-street, E.C.*; and 1, *Upper Ebbw-street, Belgrave-square, S.W.*
- 1858 Godley, John Robert, Esq. *War Office, S.W.*
- 1857 Goldsmid, Aaron A., Esq. 8, *Cavendish-square, W.*
- 1858 Goldsmid, Frederick D., Esq. 50, *Harley-street, W.*
- 1850 470 Gordon, Alexander, Esq., C.E. 3, *Middle Scotland-yard, Whitehall, S.W.*
- 1850 \*Gordon, Colonel the Hon. Alexander H., C.B. *Argyll-house, Regent-street, W.*
- 1858 Gordon, Lieut. Charles C., R.L. *Messrs. Cox and Co., Craig's-court, S.W.*
- 1854 Gordon, Harry George, Esq. 1, *Clifton-place, Hyde-park-gardens, W.*; and *Kilnross, Dunelm, Yorkshire.*
- 1855 Gordon, James Wilkinson, Esq. 10, *New Palace Yard, S.W.*
- 1850 Gordon, Rear-Admiral the Honourable John. 13, *Queen Anne-street, W.*
- 1853 Gordon, Rear-Admiral Robert. *United Service Club, S.W.*
- 1853 Gore, Montagu, Esq. 20, *South Audley-street, W.*

Year of  
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- 1853 Gore, Richard Thomas, Esq. 6, *Queen-square, Bath.*
- 1853 Gorman, John, Esq., M.D. *Mark-lane, E.C.*
- 1859 480 Gosling, Fred. Solly, Esq. 1, *Gray's-inn-square, W.C.*
- 1835 Gould, Lieut.-Colonel Francis A. *Buntingford, Herts.*
- 1846 Gould, John, Esq., F.R.S., F.L.S. 20, *Broad-street, Golden-square, W.*
- 1830 \*Gowen, James Robert, Esq. 4, *Codrington-place, Western-road, Brighton.*
- 1858 Graham, Cyril C., Esq. *Cairo*; and 129, *Park-street, Grosvenor-square, W.*
- 1833 \*Graham, the Right Hon. Sir James R. G., Bart., M.P., F.R.S., &c. 46, *Grosvenor-place, S.W.*; and *Netherby, near Carlisle.*
- 1857 Grant, Capt. W. C., 2nd Dragoon Guards. *Junior U. S. Club, S.W.*; and *Brigade Major, Lucknow.*
- 1830 \*Gray, John Edw., Esq., PH.D., F.R.S., Z.S. and L.S. *British Museum, W.C.*
- 1830 Greene, Thomas, Esq. *Slyne, Lancaster*; and *Whittington-hall, near Burton, Westmoreland.*
- 1857 \*Greenfield, W. B., Esq. 2, *Porchester-terrace North, W.*
- 1858 490 \*Gregory, Augustus Chas., Esq. *Sydney.*
- 1858 Gregory, Charles Hutton, Esq., C.E. 1, *Delahay-street, Westminster, S.W.*
- 1858 \*Gregory, Isaac, Esq. *Chorlton Hall, Manchester.*
- 1857 \*Grellet, Henry Robert, Esq. 7, *Lloyd-street, Lloyd-square, E.C.*
- 1859 Grenfell, Chas. Pascoe, Esq., M.P. 38, *Belyraec-square, S.W.*
- 1858 Grenfell, Pascoe St. Leger, Esq. *Maesteg-house, Swansea.*
- 1853 Grenfell, Riversdale W., Esq. 27, *Upper Thames-street, E.C.*
- 1830 \*Gresswell, Rev. Richard, M.A., F.R.S. *Worcester College, Oxford.*
- 1837 \*Grey, Sir George, K.C.B. *Governor & Commander-in-Chief, Cape of Good Hope.*
- 1844 \*Grey, Ralph Wm., Esq. 47, *Belyraec-sq., S.W.*; and *Chipchase-castle, Hexham.*
- 1835 500 Griffith, George Reelard, Esq. 1, *Great Winchester-street, E.C.*; and *Castle-hill, Englefield-green, Chertsey, Surrey.*
- 1839 Griffith, John, Esq. 16, *Finsbury-place South, E.C.*
- 1836 Griffith, Richard Clewin, Esq. 10, *Gower-street, Bedford-square, W.C.*
- 1859 Grimston, the Hon. and Rev. Francis S. *Wokes Colne, Halstead.*
- 1855 Grindrod, R. B., Esq., M.D., LL.D., F.L.S., &c. *Townsend-house, Malvern.*
- 1858 Grote, George, Esq. 12, *Stirile-row, W.*
- 1857 Gruneisen, Charles Lewis, Esq. 16, *Surrey-street, Strand, W.C.*
- 1858 Guisford, Thomas, Esq. *Travellers' Club, S.W.*
- 1830 \*Gurney, Hudson, Esq., F.R.S., F.S.A., F.R.S.N.A. 9, *St. James's-square, S.W.*; and *Kescick-hall, near Norwich.*
- 1859 \*Gurney, John H., Esq., M.P. 24, *Kensington Palace Gardens, W.*
- 1857 510 Gurney, Samuel, Esq., M.P. 25, *Princes-gate, Hyde-park, S.W.*; and *Cushat-ton, Surrey.*
- 1853 \*Halkett, Rev. Dunbar S. *Little Bookham, Surrey.*
- 1853 \*Halkett, Lieut. Peter A., R.N. *Wynlham Club, S.W.*
- 1853 Hall, Captain William Hutcheson, R.N., C.B., F.R.S. *United Service Club, S.W.*; *Shipbourne Lodge, Tunbridge*; and 23, *Lansdowne-road, Kensington-park, W.*

Year of Election	
1856	Halloran, Alfred L., Esq., Master R.N. <i>Coast Guard, Polperra, near Liskeard.</i>
1858	Halloran, Arthur B., Esq. <i>Principal of the South Devon Collegiate School, Heavitree, Exeter.</i>
1857	Hamilton, Edward, Esq., M.D. 22, <i>Grafton-street, W.</i>
1857	Hamilton, Edward Terriek, Esq. 32, <i>Upper Brook-street, W.</i>
1859	*Hamilton, Capt. Henry G., R.N. 71, <i>Eccleston-square, S. W.</i>
1859	Hamilton, Terriek, Esq. 121, <i>Park-street, Grosvenor-square, W.</i>
1846 520	Hamilton, Rear-Admiral W. A. Baillie. <i>Mewartney-house, Blackheath, S.E.</i>
1857	Hamilton, Wm. John, Esq., F.R.S. 23, <i>Chesham-place, S. W.</i>
1859	Hammersley, Charles, Esq. 25, <i>Park-crescent, Portland-place, W.</i>
1858	Hammond, Rev. J. W. <i>Reform Club, S. W.</i>
1853	*Hamd, Captain George S., R.N. <i>United Service Club, S. W.; and H.M.S. 'Sampson.'</i>
1857	Hankey, Thomson, Esq., M.P. 45, <i>Portland-place, W.</i>
1857	*Hammer, Sir John, Bart., M.P., F.R.S. <i>Hammer-hall and Bettisfield-park, Flintshire.</i>
1859	*Hansard, Henry, Esq. 14, <i>Park-square, Regent's-park, N. W.</i>
1849	*Harcourt, Egerton, Esq. <i>Athenæum Club; and 5, Carlton-gardens, S. W.</i>
1853	Harcourt, Rear-Admiral Octavius Vernon. 29, <i>Devonshire-place, Portland-place, W.; and Swinton-park, Bebb, Yorkshire.</i>
1854 530*	Harding, Major-Gen. George Judl, C.B. <i>Lieut.-Governor of Guernsey.</i>
1854	Hardy, Peter, Esq., F.R.S. 36, <i>Brunsvick-square, W.C.</i>
1850	*Harnett, Colonel T. G., R. Staff Corps. <i>Tricheham, S. W.</i>
1855	Harris, the Hon. and Rev. C. A. <i>Rossmore's Parsonage, Southampton.</i>
1853	Harris, Captain the Hon. Edw. A. J., R.N. <i>H.B.M.'s Minister Plenipotentiary, Brazil.</i>
1852	Harris, George Frederick, Esq., M.A. <i>Harrold-park, Middlesex, N. W.</i>
1859	Harris, Capt. Henry. 15, <i>Gloucester-terrace, Hyde-park, W.</i>
1859	Harrison, C. H. Rogers, Esq. 13, <i>Linsdowne-road, Clapham-road, S.</i>
1857	Harrison, George Marsh, Esq. 10, <i>Linsdowne-road Villas, Notting-hill, W.</i>
1858	Harowby, Dudley, Earl of. <i>Sandon-house, Lichfield; and Norton, Gloucestershire.</i>
1854 540*	Hatfield, Frederick D., Esq., F.S.A., &c. <i>The Oaklands, near Cheltenham.</i>
1846	Harvey, W. S., Esq., R.N. <i>H.M.S. 'Princess Royal,' Mediterranean; and 40, Clarendon-street, S. W.</i>
1858	Hawker, Edward J., Esq. 37, <i>Colwyn-place, W.</i>
1859	Hawkins, Bisset, Esq., M.D., F.R.S. 29, <i>Upper Harley-street, W.; and Leyell Lodge, Finsbury.</i>
1857	Hawkins, Commander Frank K., R.N. <i>Army and Navy Club, S. W.</i>
1859	*Hawkins, John, Esq.
1858	*Hawkins, Lieut.-Col. J. Summerfield, R.N. <i>N.W. American Boundary Commission.</i>
1859	Hawley, Rev. Edward Claven, D.D., F.S.A. <i>Trinity College.</i>
1852	*Hay, Capt. L. C. Dürumple, R.N. 24, <i>Prince's-gate, Hyde-park South, S. W.; and H.M.S. 'Tees.'</i>
1859	*Hay, Robert Wm., Esq., F.R.S., F.S.A., &c. <i>Blechnallen-terrace, Southampton.</i>
1853 550	Haywood, Robert Newton, Esq. <i>Porchester-villa, Grange-avenue, Edinburgh.</i>

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- 1856 Heath, J. Benjamin, Esq., F.R.S., F.S.A., Consul for Sardinia. 31, *Old Jewry, E.C.*
- 1859 Hellmann, Christian, Esq. *Club-chambers, Regent-street, S.W.*
- 1859 Hely, Hovendon, Esq. *Australian Club, Sydney.*
- 1856 Henderson, Andrew, Esq. 21, *Cambridge-street, Hyde-park-square, W.*
- 1837 \*Henderson, James, Esq. *Littlewood-park, Forbes, Aberdeenshire.*
- 1853 †Henderson, John, Esq. *Tulparaiso.*
- 1852 Henderson, William, Esq. 5, *Stanhope-street, Hyde-park-gardens, W.*
- 1844 \*Heneage, Edward, Esq. 14, *William-street, Loundes-square, S.W.*
- 1838 \*Henry, Wm. Chas., Esq., M.D., F.R.S. *Haffield, near Ledbury, Herefordshire.*
- 1834 560 Herbert, Jacob, Esq. *Trinity-house, Tower-hill, E.C.*
- 1845 \*Herbert, Right Hon. Sidney, M.P. 49, *Belgrave-square, S.W.*; and *Wilton-house, Wilts.*
- 1833 \*Herbert, Vice-Admiral Sir Thomas, K.C.B. 74, *Cudogan-place, S.W.*; and *Tore Cottage, Killbuckey, Ireland.*
- 1857 Herd, Captain D. J. 2, *Norway-house, Linehouse, E.*
- 1858 Hertslett, Edward, Esq. *Librarian, Foreign Office, S.W.*; and *Belle Vue-house, Richmond, S.W.*
- 1841 Hessey, James Augustus, Esq. 26, *Addison-road, Kensington, W.*
- 1858 Hewitt, Capt. J. Napier. *Tyr Mub Ellis, Pont-y-Pridd, Glamorgan.*
- 1856 Hewitt, James, Esq. *Lecturer in Battersea Training College, S.W.*
- 1840 \*Heywood, James, Esq., F.R.S., F.S.A. *Athenæum Club*; 5, *Eaton-place, S.W.*; and *The Headlands, Prestwich, near Manchester.*
- 1853 Hickey, Edwin, Esq. *Sydney.*
- 1856 570 Hill, Arthur Bowdler, Esq. *Southfield, Clapham-park, Surrey, S.*
- 1857 Hill, Rev. Charles C. *Southfield, Clapham-park, Surrey, S.*
- 1854 Hill, Lieut.-Colonel Stephen J. *Army and Navy Club, S.W.*; and *Governor and Commander-in-Chief, Sierra Leone.*
- 1858 Hinchliff, T. Woodbine, Esq., Barrister-at-Law. 5, *Stone-buildings, Lincoln's-inn, W.C.*
- 1846 \*Hindmarsh, Frederick, Esq. 17, *Bucklersbury, E.C.*
- 1846 Hobbs, J. S., Esq. 157, *Leadenhall-street, E.C.*
- 1855 Hobbs, Wm. Geo. Ed. *Master of Grammar School, Wareside, near Ware.*
- 1830 \*Hobhouse, Henry William, Esq.
- 1834 \*Hoggin, Thomas, Esq., M.D. 35, *Bedford-square, W.C.*
- 1856 \*Hodgson, Arthur, Esq., Superintendent of the Australian Agricultural Company.
- 1857 580 Hodgson, Kirkman Daniel, Esq., M.P. 8, *St. Helen's-place, Bishopsgate, E.C.*
- 1856 Hogg, James, Esq., Jun. 18, *St. Andrew's-square, Edinburgh.*
- 1830 Hogg, John, Esq., M.A., F.R.S., F.L.S., Foreign Sec. R. Soc. of Literature. 8, *Sergeants' Inn, Temple, E.C.*; and *Norton-house, Stockton-upon-Tees.*
- 1839 \*Holford, Robert S., Esq., M.P. *Dorchester-house, Park-lane, W.*
- 1830 Holland, Sir Henry, Bart., M.D., F.R.S. 25, *Lower Brook-street, W.*
- 1835 \*Holmes, James, Esq. 4, *New Ormond-street, Queen-square, W.C.*
- 1839 \*Holroyd, Arthur Todd, Esq., M.D., F.L.S. *Athenæum Club, S.W.*
- 1857 Holroyd, Henry, Esq., Barrister-at-Law. 2, *Elm-court, Temple, E.C.*
- 1857 Homfray, Frederick Samuel, Esq., C.E. 13, *Abingdon-street, S.W.*



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- 1857 Homfray, William Henry, Esq. 13, *Abingdon-street, S. W.*
- 1830 590\* Hooker, Sir Wm. J., K.H., PH. D., LL.D., F.R.S., F.S.A., &c. *West-park, Kew, W.*
- 1846 \*Hope, Alex. James Beresford, Esq., M.P. *Ashlow House, Connaught-place, Hyde-park, W.; and Bedjebury-park, Hurst-green, Kent.*
- 1857 Hoper, Richard, Esq. 53, *Maryuret-street, Cavendish-square, W.*
- 1857 †Hose, Rev. Henry J., M.A. *Warden of St. Paul's College University, Sydney.*
- 1853 Hoskins, George Alex., Esq. 10, *Gloucester-square, Hyde-park, W.*
- 1858 Hoste, Capt. Sir William, Bart., R.N. *United Service Club, S. W.*
- 1856 Hovell, William Hilton, Esq. *Goulburn, New South Wales.*
- 1853 Howard, Sir Ralph, Bart. 17, *Belgrave-square, S. W.; and Bushy-park, Wicklow.*
- 1857 Howard, Samuel Lloyd, Esq. *Goldings, Loughton, Essex.*
- 1842 \*Hubbard, J. Gellibrand, Esq. 24, *Prince's-gate, Hyde-park South, S. W.*
- 1857 600 Hughes, Capt. Frederic. *Ely-house, Wexford.*
- 1838 Hughes, William, Esq. 13, *Paternoster-row, E. C.*
- 1838 \*Hume, Edmund Kent, Esq.
- 1857 Hunt, Zacharias Daniel, Esq. *Aylesbury.*
- 1858 Hutchison, Thomas J., Esq. *H. B. M.'s Consul, Bayt of Biafra and Fernando Po.*
- 1851 Hyde, James Bartlet, Esq. *Conservative Club, S. W.; and Apley, Ryde, Isle of Wight.*
- 1854 Ifill, Benjamin, Esq. 2, *Craven-hill-gardens, Dayswater, W.*
- 1852 Illingworth, Richard Stonhewer, Esq. 9, *Norfolk-crescent, Hyde-park, W.*
- 1850 \*Imray, James, Esq., jun. 102, *Minorities, E.; and Manor-park, Streatham, S.*
- 1851 Inglefield, Captain Edward A., R.N., F.R.S. *United Service Club, S. W.*
- 1846 610 Ingram, Hughes Francis, Esq. *University Club, S. W.; and Fotes-court, Mere-worth, Maidstone.*
- 1852 \*Inskip, Rev. Robert Mills. 8, *Boon's-place, Plymouth.*
- 1840 \*Irby, Frederick W., Esq. *Athenæum Club, S. W.*
- 1853 Irving, Thomas, Esq. 9, *Norland-place, Notting-hill, W.*
- 1850 Jackson, William, Esq. 47, *Russell-square, W. C.*
- 1855 Jackson, William, Esq., M.P. *Penton's Hotel, S. W.*
- 1857 James, Colonel Hy., R.L., F.R.S. *Superintendent Ordnance Survey, Southampton.*
- 1859 \*Janson, T. Corbyn, Esq. *Stamford-hill, N.*
- 1857 Jefferson, Richard, Esq. *Army and Navy Club, S. W.*
- 1854 Jellicoe, Charles, Esq. 5, *Wimpole-street, W.*
- 1859 620 Jenken, H. Dietrich, Esq. 10, *St. Southan's-lane, E. C.*
- 1854 Jenkins, Capt. Griffith, L.N. *India; and East India Club, St. James's-sq., S. W.*
- 1840 \*Jenkins, R. Castle, Esq.
- 1851 Jennings, John, Esq., F.R.S. 20, *New Grennel-street, Queen-square, W. C.*
- 1854 \*Jennings, William, Esq., M.A. 13, *Victoria-street, Westminster, S. W.*
- 1858 Jermyn, the Venerable Archdeacon Hugh Willoughby. 24a, *Bryanston-sq., W.*

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- 1858 Johnson, Capt. Clement. *Carlton Club*; and 1, *Whitehall*, S. W.
- 1857 Johnson, Edmund Chas., Esq. 20, *Arlington-street*, S. W.; and 6, *Savile-row*, W.
- 1859 \*Johnson, Henry, Esq. 39, *Critchard Friars*, E. C.
- 1854 Johnson, John Hugh, Esq. 4, *Stafford-place*, *Pinlipo*, S. W.
- 1843 630 Johnston, Alex. Keith, Esq., F.R.S.E., Hon. Mem. Berl. Geog. Soc., etc. *March-hill park*; and 4, *St. Andrew-square*, *Edinburgh*.
- 1856 Johnston, A. R., Esq. *Athenæum Club*; and 25, *Mount-street*, W.
- 1857 Johnston, J. Brookes, Esq. *Newington-terrace*, *Kennington-park*, S.
- 1858 Johnston, Capt. J. Gilbert. 8, *Fork-terrace*, *Regent's-park*, N. W.
- 1853 Johnstone, Sir John V. B., Bart., M.P., D.C.L. 27, *Grosvenor-square*, W.; and *Hackness-hall*, near *Scarborough*.
- 1858 Jones, Capt. Edward Monckton, 20th Regt. *Student*, *Staff College*, *Sandhurst*.
- 1851 Jones, Major-General Sir Harry D., R.E., K.C.B. *R. M. College*, *Farnborough Station*, *Hunts*.
- 1857 Jones, Capt. Jenkin, Bengal Engineers. *Junior United Service Club*, S. W.; and 1, *Lennox-place*, *Circus-road*, *St. John's-wood*, N. W.
- 1843 \*Jones, William H., Esq., F.H.S. 4, *Rupert-street*, W.
- 1840 \*Kalergi, John, Esq. 23, *Montagu-square*, W.
- 1855 640† Kane, Major Fred. A. C., 15th Regt. *Bombay N. I. Junior United Service Club*, S. W.
- 1858 Kay, David, Esq. 6, *North Bridge*, *Edinburgh*.
- 1858 Keane, Edward Arthur, Lord. 17, *St. George's-place*, *Hyde-park-corner*, S. W.; and *Stetchworth-park*, *Newmarket*.
- 1857 Keating, Sir Henry Singer, Q.C., M.P. 13, *Great Queen-street*, *Westminster*, S. W.
- 1857 Keene, Rev. C. E. Ruck. *Seynecombe-park*, *Henley-upon-Thames*.
- 1845 \*Kellett, Commodore Henry, R.N., C.B. *Clonmell*, *Ireland*; and *H.M.S. 'Invincible'*, *Jamaica*.
- 1859 Kennard, Coleridge J., Esq. 26, *Chester-terrace*, *Regent's-park*, N. W.
- 1854 Kennedy, Rev. John, M.A. 4, *Stepney-green*, E.
- 1851 †Kent, John, Esq. *Shafston*, *Moreton Bay*, *Australia*.
- 1857 Keysell, Francis P., Esq. *Sycamore Villa*, 35, *Carlton-hill*, *St. John's-wood*, N. W.
- 1846 650 King, Lieut.-Colonel Edward R., 36th Regt. *Junior United Service Club*, S. W.
- 1858 King, Rev. Samuel W., A.M. *Sacringham Rectory*, *Norfolk*.
- 1857 Kinkel, Gottfried, Esq., PH. D. 6, *Lastbourne-terrace*, W.
- 1857 \*Kinnaird, Hon. Arthur F., M.P. 2, *Pall-mall East*, S. W.
- 1858 †Kirk, John, Esq., M.D. *Livingstone Expedition*; and *Arbirlot*, *Arbroath*, *Scotland*.
- 1859 Labrow, Valentine, Esq. 22, *Chancery-lane*, W. C.
- 1849 \*Laffan, Capt. Robert Michael, R.E. *Army and Navy Club*, S. W.; and *Otham-lodge*, *Kent*.
- 1833 \*Laird, M'Gregor, Esq. 3, *Mincing-lane*, E. C.; and 2, *Clarendon-terrace*, *Brighton*.
- 1859 Lamb, Lieut. Henry, R.N. *East India House*, *Leadenhall-street*, E. C.
- 1838 \*Lance, John Henry, Esq., F.L.S. *The Holmwood*, *Dorking*.
- 1859 660 \*Lange, Daniel A., Esq. 202, *Ficcadilly*, W.

- Y. or of  
F. or of
- 1856 Langier, J. R., Esq., Lecturer, Wesleyan Normal Institution. *Westminster, S. W.*
- 1856 Lansdowne, Henry, Marquis of, K.G., D.C.L., F.R.S. *Lansdowne-house, Berkeley-square, W.; Richmond-hill, Surrey, S. W.; and Bowood-park, Wilts.*
- 1855 \*Larcom, Lieut.-Colonel Sir Thomas Aiskew, R.E., F.R.S. *Custom-house, Dublin.*
- 1859 Larnach, Donald, Esq. 21, *Kensington Palace Gardens, W.*
- 1855 Laroche, William Thomas, Esq. *Reform Club, S. W.; and Wanstead.*
- 1852 Latham, Robert Gordon, Esq., M.D., F.R.S., &c. *Greenford-house, Hanwell, Middlesex, W.*
- 1854 Latrobe, Charles Joseph, Esq. *Athenæum Club, S. W.; and The Mote, Tunbridge.*
- 1854 Laune, Walter, Esq. 2, *Princes-street, Mansion-house, E.C.*
- 1846 \*Law, the Hon. Henry Spencer, M.A. *Ellington-house, Ramsgate.*
- 1850 670 Law, William J., Esq. 63, *Upper Seymour-street, W.; 33, Lincoln's-inn-fields, W.C.; and 5, Sussex-square, Brighton.*
- 1851 Lawrence, Edward B., Esq. 20, *King-street, Portman-square, W.*
- 1857 Layard, Austin H., Esq., D.C.L. 130, *Piccadilly, W.*
- 1850 \*Leake, Colonel William M., R.A., LL.D., F.R.S. 50, *Queen-Anne-street, W.*
- 1853 \*Le Breton, Francis, Esq. 21, *Sussex-place, Regent's-park, W.*
- 1856 Lee, Charles, Esq. 41, *Grosvenor-place, S. W.*
- 1857 †Lee, George, Esq. *Postmaster-General, Colombo, Ceylon.*
- 1850 \*Lee, John, Esq., LL.D., F.R.S., F.S.A., F.R.S.N.A., &c. 5, *College, Doctors'-commons, E.C.; and Hartwell-house, near Aylesbury, Bucks.*
- 1859 Lee, Thomas, Esq. 5, *George-yard, Lombard-street, E.C.; and Great Barr, Staffordshire.*
- 1853 \*Lefevie, Sir John George Shaw, M.A., D.C.L., F.R.S., Vice-Chancellor of the University of London. 8, *Spray-gardens, S. W.*
- 1858 680 Leftoy, Charles E., Esq. *Eusht-house, Farnham, Surrey.*
- 1853 Leftoy, Colonel John Henry, R.A., F.R.S. *War Department, Pall Mall, S. W.; and 54, Cambridge-terrace, Hyde-park, W.*
- 1845 Leigh, John Studdy, Esq. 7, *St. Stephen's-terrace, Westbourne-grove, W.*
- 1836 Lemon, Sir Charles, Bart., F.R.S., &c. *Curdor, near Falmouth, Cornwall.*
- 1857 \*Lenox, George Wm., Esq. 30, *Bedford-square, W.C.; and Pont-y-Pridd, Glamorganshire.*
- 1855 Leslie, George F. Esq. 45, *Rotond-gate, Hyde-park, S. W.*
- 1859 Leslie, Patrick, Esq. 40, *Albion-street, Hyde-park, W.*
- 1859 Leslie, Walter D., Esq. 45, *Rotond-gate, S. W.*
- 1840 \*Letts, Thomas, Esq. 8, *Royal Exchange, E.C.*
- 1857 Levenson, George B. C., Esq. 19, *Bloomsbury-square, W.C.*
- 1858 690 Lowell, Charles, Esq. PH. DR. *Swalin; and Red Sea Telegraph Company, 62, Newgate-street, E.C.*
- 1859 Lewis, Rev. Evan, F.A. *Rothwell, Northamptonshire.*
- 1858 Lewis, Rev. Henry, M.A. *St. Paul's Church, Dulwich, Clapham-common, S.*
- 1852 Leycester, Commander Edmund M., R.N. *H.M.S. 'Mudagiscar,' Rio Janeiro.*
- 1857 Lindet, Capt. Francis, R.N. *Exmouth, Devon, S.E.*
- 1857 Lindsay, Colonel the Hon. J., Gen. Guards, M.P. 20, *Portman-square, W.*
- 1855 Lindsay, Wm. S., Esq., M.P. 17, *Portland-place, W.; and Manor House,*

Year of  
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- 1858 Lister, John, Esq., M.D. 6, *Porchester-terrace, Hyde-park, W.*
- 1857 \*Lloyd, George A., Esq. 2, *Royal Exchange-buildings, E.C.*
- 1859 Loch, Henry B., Esq. 11, *Brook-street, W.*
- 1857 700 Loch, William Adam, Esq. 8, *Great George-street, Westminster, S.W.*
- 1852 Locke, Joseph, Esq., M.P., F.R.S., President Inst. Civil Engineers. 13, *Duke-street, Westminster; and 23, Lornes-square, S.W.*
- 1858 Lockhart, William, Esq., F.R.C.S. *Granville-park-villas, Blackheath, S.E.*
- 1856 \*Logan, Sir William Edmond, F.R.S. *Montreal, Canada.*
- 1855 Login, Sir John, Surgeon E. I. C. Service. *Church House, Kew, S.W.*
- 1850 Londesborough, Albert, Lord, F.R.S., F.S.A. 8, *Carlton-house-terrace, S.W.; and Grimston, Tufcoster, Yorkshire.*
- 1830 Long, George, Esq., M.A. 22, *Buckingham-street, Brighton.*
- 1839 \*Long, Henry L., Esq. *Travellers' Club, S.W.; and Hampton-lodge, Farnham, Surrey.*
- 1857 \*Long, W. Beeston, Esq. 4, *Great Cumberland-place, W.*
- 1858 Longden, Morrell D., Esq. 4, *Ennismore-place, Hyde-park, S.W.*
- 1847 710 Longman, Thomas, Esq. *Paternoster-row, E.C.; and 8, Sussex-square, Hyde-park, W.*
- 1858 Longman, William, Esq. 36, *Hyde-park-square, W.*
- 1856 Lovett, Phillips Cosby, Esq. *Liscombe-house, Liscombe, near Leighton Buzzard, Bucks.*
- 1858 Lowden, Rev. George Rouse. 12, *Leinster-jardens, Hyde-park, W.; and Ux-bridge.*
- 1859 Lowe, Capt. W. Drury, A.D.C. to Inspector-General of Cavalry. *Carlton Club, S.W.*
- 1839 Lowry, Joseph Wilson, Esq. 45, *Robert-street, Hampstead-road, N.W.*
- 1830 \*Lyell, Sir Charles, M.A., LL.D., F.R.S. 53, *Harley-street, Cavendish-square, W.*
- 1837 \*Lynch, Capt. H. Blossie, C.B., Indian Navy, F.R.A.S. *Athenæum Club, S.W.*
- 1858 Lyne, Francis, Esq. 13, *Bristol-jardens, Maida-hill, W.*
- 1830 MacDonnell, John, Esq. 48, *Grove-end-road, St. John's-wood, N.W.*
- 1858 720 MacDougall, Alex. H., Esq. 44, *Parliament-street, Westminster, S.W.*
- 1854 McDowell, William, Esq. 28, *Three alleys-street, E.C.*
- 1856 Macgregor, Alexander, Esq. 23, *Upper Wimpole-street, W.*
- 1855 McGregor, Duncan, Esq. *Board of Trade, S.W.; and Athenæum Club, S.W.*
- 1839 Macintosh, Lieut.-General Alex. Fisher, K.H. 7, *Tidney-street, Park-lane, W.*
- 1845 \*Macintyre, Patrick, Esq., F.S.A., Off. Assoc. Inst. Act. 8, *Waterloo-place, Pall-mall, S.W.; and 13, Greville-place, Kilburn-priory, W.*
- 1859 Mackay, Rev. Alexander, A.M. *Rhyuic, Aberdeenshire.*
- 1859 \*Mackean, Thos. W. L., Esq. 24, *Orford-square, Hyde-park, W.*
- 1845 Mackenzie, Right Hon. Holt, F.R.A.S. *Athenæum Club, S.W.; and 28, Wimpole-street, W.*
- 1858 McKerrell, Robert, Esq. *Mauritius.*
- 1830 730 Mackillop, James, Esq., F.R.A.S. *King's-arms-yard, E.C.*
- 1855 Mackinnon, Wm. Alex., Esq., M.P., F.R.S. 4, *Hyde-park-place, W.*
- 1852 McLeod, J. Lyons, Esq., late Consul for Mozambique.
- 1852 McLeod, Walter, Esq. *Head Master of the Royal Military Asylum, Chelsea, S.W.*

Year of  
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- 1855 Maclure, Andrew, Esq. 37, *Walbrook, E.C.*
- 1855 \*McClure, Captain Sir Robert J. Le M., R.N. *H.M.S. 'Esk.'*
- 1855 Maenab, John, Esq. *Steak's-place, Leith-walk, Edinburgh.*
- 1839 McNeil, The Right Hon. Sir John, G.C.B. *Granton, near Edinburgh.*
- 1856 \*Macpherson, Duncan, Esq., M.D., Inspector-General of Hospitals. *Madras.*
- 1845 Macqueen, James, Esq. 43, *Kensington-square, W.*
- 1830 740 \*Magrath, Edward, Esq. *Hampstead-leath, N.W.*
- 1853 Majendie, Ashhurst, Esq., F.R.S. *Athenæum Club, S.W.; 152, Albany-street, Regent's-park, N.W.; and Heddingham-castle, Essex.*
- 1845 \*Major, Richard Henry, Esq. *British Museum, W.C.*
- 1858 Malby, John Walter, Esq. 8, *Swinton-street, Gray's-inn-road, W.C.*
- 1853 \*Malby, Thomas, Esq. 8, *Swinton-street, Gray's-inn-road, W.C.*
- 1843 \*Malcolm, W. E., Esq. *Burnfoot, Langholme, near Carlisle.*
- 1853 \*Mallet, Charles, Esq. *Audit Office, W.C.; and Belmont, Hampstead, N.W.*
- 1836 \*Manchester, James Prince Lee, Bishop of, F.R.S., &c. *Athenæum Club, S.W.; and Scotch-church, Manchester.*
- 1856 Mandeville, J. Henry, Esq., late H.M.'s Minister Plenipotentiary at Buenos Ayres. 11, *Rotham-pate, S.W.*
- 1830 \*Mangles, Capt. James, R.N., F.R.S. *Fairfield, near Exeter.*
- 1856 750 Manning, Frederick, Esq. *Byron-budge, Leamington.*
- 1859 Mantell, Wm. Walter, Esq. 47, *Mount-street, Grosvenor-square, W.*
- 1839 \*Marjombanks, Edward, Esq. 34, *Wimpole-street, W.*
- 1854 Markham, Clements Robert, Esq. 21, *Leekston-square, S.W.*
- 1836 \*Markham, Edward, Esq. 45, *Welbeck-street, Cavendish-square, W.*
- 1857 Maithorough, George, Duke of. *Blenheim, Woodstock.*
- 1857 \*Marsden, Robert C., Esq. 14, *Hammer-terrace, Regent's-park, N.W.*
- 1857 Mash, Matthew Henry, Esq., M.P. *Oxford and Cambridge Club, S.W.; and 41, Rotham-pate, High-park, S.W.*
- 1854 Marshall, James Garth, Esq. *Heotlingley, near Leeds, Yorkshire; and Monk Coniston, Ambleside.*
- 1859 \*Marsham, the Hon. Robert. *The Mote, Maidstone, Kent.*
- 1857 760 Marshman, J. C., Esq. 7, *Kensington-palace-gardens, W.*
- 1857 Martin, Francis P. B., Esq.
- 1849 Martin, R. Montgomery, Esq. 23, *Gloucester-street, Camden-hill, Kensington, W.*
- 1830 \*Mauineau, Joseph, Esq., F.Z.S., F.H.S. *Athenæum Club, S.W.; Basing-park, Alton, Hunts; and Whitbread's Brewery, E.C.*
- 1845 \*Matheson, Sir James, Bart., M.P., F.R.S. 13, *Cleveland-row, S.W.; and Ashmy, Bonvo-bridge, Sutherland-shire, &c.*
- 1858 Matheson, James Ewing, Esq. 77, *Lombard-street, E.C.; and 16, Queen's-gardens, Bayswater, W.*
- 1837 \*Maughan, Captain P., Indian Navy, F.R.A.S. 37, *Mchill-street, Edinburgh.*
- 1855 My, Daniel John, Esq., R.N. *H.M.S. 'Taneyard.'*
- 1858 Mayer, Joseph, Esq., F.S.A. 68, *Lord-street, Liverpool.*
- 1858 Mayo, John Polo, Esq. *Army and Navy Club, S.W.*
- 1854 770 Melvill, Colonel Peter, Military Secretary to the Bombay Government, 14, *Adelphi-terrace, Brighton.*
- 1838 Mellil, Philip, Esq., F.R.A.S. *East India House, E.C.*

Year of Election	
1842	*Merivale, Herman, Esq., Under Secretary of State for the Colonies. 26, <i>Westbourne-terrace</i> , W.
1854	Methuen, Captain Robert. <i>Oriental Club</i> , W.
1859	Miland, John, Esq. 4, <i>Mount-street</i> , <i>Berkeley-square</i> , W.
1853	*Miller, Captain Thomas, R.N. <i>United Service Club</i> , S.W.
1857	Mills, Arthur, Esq., M.P. 34, <i>Hyde-park-gardens</i> , W.
1845	Milne, Alexander, Esq., C.B., Commissioner of Woods and Forests. 29, <i>St. James's-place</i> , S.W.
1853	Milnes, Richard Monckton, Esq., M.P. 16, <i>Upper Brook-street</i> , W.; <i>The Hall, Bactry</i> ; and <i>Fryston-hall</i> , <i>Ferribridge</i> , <i>Yorkshire</i> .
1837	*Milton, William Thomas, Viscount. 4, <i>Grosvenor-square</i> , W.; and <i>Wentworth-house</i> , <i>Rotherham</i> , <i>Yorkshire</i> .
1859	780 Mitchell, William, Esq. 54, <i>Gracechurch-street</i> , <i>L.C.</i>
1851	*Mocatta, Frederick D., Esq. 35, <i>Gloucester-place</i> , <i>Portman-square</i> , W.
1853	Mocatta, George, Esq. <i>Sydney</i> .
1858	Moffat, Robert, Esq. <i>Government Surveyor</i> , <i>Hope Town</i> and <i>Kuruman</i> , <i>Cape of Good Hope</i> .
1853	Moffatt, George, Esq. 103, <i> Eaton-square</i> , S.W.
1842	*Montagu, Major Willoughby. <i>Chaplains-common</i> , S.
1842	*Monteagle, Thomas, Lord, F.R.S. 7, <i>Park-street</i> , <i>Westminster</i> , S.W.; and <i>Mount Trenchard</i> , <i>Limerick</i> .
1830	*Montefiore, Sir Moses, Bart., F.R.S., F.R.S.N.A. 7, <i>Grosvenor-gate</i> , <i>Park-lane</i> , W.; and <i>East Cliff-lodge</i> , <i>Ramsgate</i> .
1830	*Monteith, Lieut.-General William, E.I.C. Eng., F.R.S. 11, <i>Upper Wimpole-street</i> , W.; and <i>Oriental Club</i> , W.
1859	Montgomerie, F. Butler, Esq. 2, <i>Cleveland-row</i> , <i>St. James's</i> , S.W.; and <i>St. Leonard's-on-Sea</i> .
1839	790 Moody, Lieut.-Colonel R.C., R.E. <i>British Columbia</i> ; and <i>Junior United Service Club</i> , S.W.
1859	Moon, William, Esq. 104, <i>Queen's-road</i> , <i>Brighton</i> .
1857	*Moor, Rev. Allen P., M.A., F.R.A.S. <i>Sub-Warden St. Augustine College</i> , <i>Canterbury</i> .
1854	Moore, Major J. A., F.R.S. 19, <i>Portland-place</i> , W.
1857	Moore, Captain John, R.N., C.B. <i>H.M.S. 'Hogue'</i> , <i>Greenock</i> .
1857	Moore, Major-General W. Y. <i>United Service Club</i> , S.W.
1853	Moonson, Captain William, R.N., C.B. <i>Army and Navy Club</i> , S.W.; and <i>H.M.S. 'Indem'</i> .
1839	*Morris, Charles, Esq. <i>University Club</i> , S.W.
1858	Mudie, Charles Edward, Esq. 13, <i>Russell-square</i> , W.C.
1855	Muir, Thomas, Esq. 24, <i>Fork-terrace</i> , <i>Regent's-park</i> , N.W.
1858	800 Mueller, Ferdinand, Esq., M.D., PH. DR. <i>Director of the Botanical Gardens</i> , <i>Melbourne</i> .
1830	*Murchison, Sir Roderick Impey, G.C.S.T.S., M.A., D.C.L., V.P.R.S., G.S., and L.S., Director-General of the Geological Survey of Great Britain and Ireland, Trust. Brit. Mus., Hon. Mem. R.S. of Ed., R.I.A., Mem. Acad. St. Petersburg. Berlin, Stockholm, Brussels, and Copenhagen, Corr. Ins. Fr., etc. etc. 16, <i>Belgrave-square</i> , S.W.; and 28, <i>Jernyn-street</i> , S.W.

Year of  
Election.

- 1859 Murchison, Capt. Kenneth R. *Bath*.
- 1830 \*Murdock, Thomas W. C., Esq. 8, *Park-street, Westminster, S.W.; and River-bank, Putney, S.W.*
- 1851 Murray, George, Esq. 5, *Austin Friars, E.C.*
- 1851 \*Murray, Capt. the Hon. Henry Anthony, R.N. 4*d*, *Albany-chambers, Piccadilly, W.*
- 1844 \*Murray, James, Esq. *Foreign Office, S.W.*
- 1830 Murray, John, Esq. 50, *Albemarle-street, W.; and Newstead, Wimbledon, S.W.*
- 1853 Napier, Col. George Thomas Conolly, C.B., Assistant Adjutant-General. *Junior United Service Club, S.W.*
- 1857 Napier, Hon. William. 22, *Green-street, Grosvenor-square, W.*
- 1857 810 Nares, Francis, Esq. *Athenæum Club, S.W.*
- 1859 \*Nasmyth, Capt. David J. *Bhoj, Bombay Presidency.*
- 1857 Nelthropp, George, Esq. 20, *Gloucester-street, Belgrave-road, S.W.*
- 1857 \*Nebutt, Henry, Esq. 8, *Horsey-row, Canonbury, Islington, N.*
- 1856 Newman, Thomas Holdsworth, Esq. 14, *Abington-street, S.W.*
- 1853 Nicholson, Sir Charles, Bart., D.C.L., Chancellor of the University, Sydney. 65, *Cornwall, L.C.*
- 1844 †Nicolay, Rev. Chas. G. *Bath.*
- 1836 Nicolson, Capt. Sir Frederick William Erskine, Bart., R.N. 14, *William-street, Lonsdale-square, S.W.*
- 1858 Nix, John H., Esq. 77, *Lombard-street, L.C.*
- 1857 Nollall, C. T. A., Esq., Master-Commander R.N., Master Attendant at the Royal Clarence Victualling Yard, Gosport. *The Priory, Plympton, Devon.*
- 1857 820 \*Nolloth, Captain Matthew S., R.N. *United Service Club, S.W.; and Peckham, Surrey, S.E.*
- 1854 Norman, Henry, Esq. 11, *Henrietta-street, Cavendish-square, W.*
- 1856 North, Frederic, Esq., M.P. 3, *Victoria-street, Westminster, S.W.; and Hastings-budge, Hastings.*
- 1830 \*Northumberland, Algernon, Duke of, Vice-Admiral, K.G., F.R.S., F.S.A., F.R.S.N.A., Pres. R.I. *Northumberland-house, Charing-cross, S.W.; Alnwick and Keilden Castles, Northumberland; Werrington-park, Cornwall; Lion-house, Middlesex, W.; and Stanwick-park, Yorkshire.*
- 1858 \*Oakley, R. Banner, Esq. *Ossulthirk-hall, Yorkshire.*
- 1855 O'Byrne, Robert, Esq. 9, *Adelphi-terrace, Strand, W.C.*
- 1856 O'Byrne, W. R., Esq. 9, *Adelphi-terrace, Strand, W.C.; and Cranford, Middlesex.*
- 1856 O'Connor, Col. Luke Smyth, C.B., Governor of the Gambia. *United Service Club, S.W.*
- 1858 Ogilvie, Edward D., Esq.
- 1859 Ogle, John W., Esq., M.D. 13, *Upper Brook-street, W.*
- 1855 830 Oliphant, Laurence, Esq. *Athenæum Club, S.W.*
- 1853 Oliphant, Benjamin, Esq., F.R.S. 8, *Upper Hyde-park-street, W.*
- 1845 \*Ommund, Capt. E. Smith, R.N., F.P.A.S. H.M.S. 'Brunswick,' Channel Fleet.

Year of  
Election.

- 1838 \*Ommanney, H. M., Esq. *Blackheath, S.E.*
- 1853 O'Reilly, Commr. Montagu F., R.N. 4, *Brand-street, Greenwich, S.E.; and H.M.S. 'Lapwing,' Mediterranean.*
- 1853 Osborn, Sir George R., Bart. *Travellers' Club, S.W.; and Chicksand-priory, Beds.*
- 1856 Osborn, Capt. Sheiard, R.N., C.B., Officier de Légion d'Honneur. *Hawick, Lincolnshire.*
- 1852 Oswell, William Cotton, Esq. *Burlington Hotel, Cork-street, W.*
- 1855 Otway, Arthur John, Esq. 18, *Chapel-street, Park-lane, W.*
- 1854 †Ouchterlony, James, Esq. *Madras.*
- 1844 840\*Overstone, Samuel, Lord, M.A., M.R.I. 2, *Carlton-gardens, S.W.; and Wickham-park, Surrey.*
- 1854 Oxenham, Rev. William, M.A. *Harrow, Middlesex, N.W.*
- 1846 \*Oxford, Samuel Wilberforce, Bishop of, F.R.S., F.S.A. 26, *Pall-mall, S.W.; Cuddesden Palace, Wheatley, Oxfordshire; and Lavington, Sussex.*
- 1852 Packman, Fred. W. S., Esq., M.D. 12, *Clarges-street, Piccadilly, W.; and Cup-ton-hall, Chastelfield, Derbyshire.*
- 1853 Pakington, Right Hon. Sir John Somerset, Bart., M.P. 41, *Eaton-square, N.W.; and Westwood-park, Droitwich, Worcestershire.*
- 1856 †Palliser, Captain John. *British North American Expedition; Comrah, Kilmickthomas, Waterford; and National Club, Whitehall-gardens, S.W.*
- 1855 Palmer, Major Edm., R.A. 3, *Wellington-terrace, Charlton, Blackheath, S.E.*
- 1838 \*Palmer, Samuel, Esq.
- 1851 Palmerston, Henry John, Lord Viscount, M.P., K.G., G.C.B., F.R.S., &c. *Cambryge-house, Piccadilly, W.; and Broadlands, Romsey, Hants.*
- 1849 \*Parish, Commr. John E., R.N. *Army and Navy Club, S.W.; and Quarry-house, St. Leonard's-on-Sea.*
- 1833 850\*Parish, Sir Woodbine, K.C.H., F.R.S., &c. *Quarry-house, St. Leonard's-on-Sea.*
- 1852 Parker, J. William, Esq., jun. 445, *West Strand, W.C.*
- 1850 †Parkes, Harry S., Esq. *Oriental Club, W.; and H.B.M.'s Consul at Amoy, China.*
- 1850 \*Parkyns, Mansfield, Esq., F.Z.S. *Arthur's Club, St. James's-street, S.W.; and Woodborough-hall, Southwell.*
- 1854 Parr, Thomas Clements, Esq., M.A. 21, *West-mall, Clifton.*
- 1830 \*Pasley, Sir Charles William, K.C.B., R.E., F.R.S., Lieut.-Gen. 12, *Norfolk-crescent, Hyde-park, W.*
- 1859 Pasteur, Marc Henry, Esq. 20, *Chester-street, S.W.*
- 1857 †Paton, Andrew A., Esq. *H.B.M.'s V.-Consul, Missolonghi, Greece.*
- 1858 Paul, Joseph, Esq. *Ormonde-house, Ryde, I. of Wight.*
- 1847 \*Paynter, William, Esq., F.R.A.S. 21, *Belgrave-square, S.W.; and Camborne-house, Richmond, Surrey, S.W.*
- 1855 860 Peabody, George, Esq. 22, *Old Broad-street, E.C.*
- 1853 Peacock, George, Esq. *Sturcross, near Exeter.*
- 1853 \*Peckover, Alexander, Esq. *Wisbeach.*
- 1858 Peel, Sir Robert, Bart., M.P. 8, *Belgrave-square, S.W.; and Drayton Manor, Timworth.*
- 1848 \*Pelly, Sir John Henry, Bart. *Upton, Essex.*



Year of  
Election.

- 1840 \*Penn, Richard, Esq., F.R.S. 6, *Leicester-place, Richmond, S.W.*
- 1853 Perry, Colonel the Hon. Hugh M. (Guards). 8, *Portman-square, W.*
- 1846 Pöckmann, Augustus, Ph.Dr., Hon. Memb. Berl. Geog. Soc. *Gotha.*
- 1857 \*Peters, William, Esq. 35, *Nicholas-lane, Lombard-street, E.C.*
- 1858 Peter, Sir S. Morton, Bart., M.P. 12, *Kensington-park-gardens, W.*
- 1854 270 Phelps, William, Esq. 18, *Montagu-place, Russell-square, W.C.*
- 1857 Phillimore, Capt. Augustus, R.N. *Shiploke House, Reading; and U. S. Club.*
- 1843 Phillimore, John George, Esq., Q.C. 19, *Old-square, Lincoln's-inn, W.C.; and 21, Chester-square, S.W.*
- 1850 \*Phillips, Sir Thomas, Bart., M.A., F.R.S., & S.A. *Athenæum Club, S.W.; and Melville-hill, Brounny, Worcestershire.*
- 1854 Phillips, Major-General Sir B. Travell. *United Service Club, S.W.*
- 1856 Phillips, John, Esq., Solicitor. *Hastings.*
- 1854 Phillips, T. Bacon, Esq. 36, *Laundorne-place, Brighton.*
- 1850 Plann, Thomas, Esq., Q.C. 50, *Pall Mall, S.W.*
- 1852 Pike, Lieut.-Commander John W., R.N. 26, *Burlington-street, W.; Junior United Service Club, S.W.; and H.M.S. 'Antelope,' West Coast of Africa.*
- 1855 Pilkington, James, Esq., M.P. *Reform Club, S.W.; and Blackburn.*
- 1851 222 \*Pim, Commander Richard C.T., R.N. *Junior United Service Club, S.W.; and H.M.S. 'Porpoise.'*
- 1858 Pinnett, James, Esq. *University College, London, W.C.; and Christchurch-street, Brompton, W.C.*
- 1858 Platen, His Excellency Count. Minister Plenipotentiary, Sweden and Norway. 41, *Leicester-place, S.W.*
- 1856 \*Plowes, John Henry, Esq. 39, *York-terrace, Regent's-park, N.W.*
- 1844 \*Plock, John I., Esq. 19, *Chester-terrace, Regent's-park, N.W.; and Puckrup-hill, E. Sussex.*
- 1855 \*Pollexfen, Capt. J. J. 14, *St. James's-square, S.W.; and Union-place, Bridge of Alva, Strathshire.*
- 1857 \*Pollington, John Charles George, Viscount, F.R.A.S. *Mesley-park, near Leeds.*
- 1853 Pollock, Lieut.-General Sir George, G.C.B. *Chydam-common, Surrey, S.*
- 1855 \*Ponsonby, Hon. Frederick G. B. 3, *Mount-street, Grosvenor-square, W.*
- 1857 Pope, Captain W. A. 14, *St. James's-square, S.W.*
- 1853 292 Porter, Edward, Esq. *Athenæum Club, S.W.; and 26, Suffolk-street, Pall-mall, S.W.*
- 1855 Porter, Rev. J. Leslie, A.M. *Monkton Park, Conrathscrope, Ireland.*
- 1850 \*Portlock, Maj.-Gen. Joseph E., F.R.S. *War Department, 1, Whitehall-gate, S.W.; and 58, Queen's-gate, Hyde-park, W.*
- 1850 Pottinger, Lieut.-Colonel William. *Junior United Service Club, S.W.*
- 1852 +Powell, Lewis, Esq. *Port Louis, Mauritius.*
- 1850 Power, F. Rawdon, Esq. *Portman-street; and 108, Jermyn-street, S.W.*
- 1854 +Power, John, Esq. 25, *St. James's-park, N.W.; and Panama.*
- 1854 Power, John Arthur, Esq., M.A., & M. 52, *Barton-reservoir, W.C.*
- 1856 Powys, the Hon. Thomas L. 19, *Leicester-place, S.W.; and Langdon Court, Kent.*

Year of  
Election.

- 1847 Pratt, F. T., Esq., D.C.L. 2, *College, Doctors'-commons, E.C.*
- 1853 900 Price, Jas., Esq., M.D., F.R.C.S., &c. *Lyfra-road, Brixton, Surrey, S.*
- 1852 Price, James Glenie, Esq., Barrister-at-Law. 14, *Clement's-inn, W.C.*
- 1859 Price, Capt. R. Havard, 31st Bengal N. Infantry. *Warley Barracks, Brentwood.*
- 1855 \*Pringle, Thomas Young, Esq. 14, *Eaton-square, S.W.*
- 1845 Prinsep, Henry T., Esq. *Little Holland-house, Kensington, W.*
- 1859 Pritchard, Wm, Thos., Esq. *H.B.M.'s Consul, Fiji.*
- 1852 Prout, John William, Esq., M.A., Barrister-at-Law. *Athenæum Club, S.W.; and Newston-house, Willesden, Middlesex, N.W.*
- 1844 Puller, Christopher W., Esq., M.P. *Athenæum Club, S.W.; and Youngsbury, Ware, Herts.*
- 1857 Purcell, Edward, Esq., LL.D. 14, *Croom's-hill, Greenwich, S.E.*
- 1854 \*Quin, Rear-Admiral Michael. *Senior U. S. Club, S.W.; and 18, Albion-villas, Albion-road, Islington, N.*
- 1858 910 \*Radstock, Graville Augustus, Lord. 26, *Portland-place, W.*
- 1853 Rae, John, Esq., M.D. *Canada.*
- 1851 \*Ramsay, Rear-Admiral Wm., C.B., F.R.A.S. *Junior U. S. Club, S.W.; and 23, Ainslie-place, Edinburgh.*
- 1859 Ratchiff, Charles, Esq., F.S.A. *National Club, S.W.; Edgbaston, Birmingham; and Downing College, Cambridge.*
- 1846 Ravenshaw, E. C., Esq., M.R.A.S. *Oriental Club, W.; and 40, Harley-street, Cavendish-square, W.*
- 1844 \*Rawlinson, Maj.-General Sir Henry C., K.C.B., D.C.L., F.R.S. *Athenæum Club, S.W.; and 21, Langham-place, W.*
- 1838 Rawson, Rawson Wm., Esq., C.B., Colonial Secretary. *Cape of Good Hope.*
- 1852 Raymond, Ven. Archdeacon, of Durham. *Athenæum Club, S.W.; 17, Cumberland-street; and Durham.*
- 1857 Reed, William, Esq. *Oak Lodge, Addison-road, Kensington, W.*
- 1858 Rees, L. E. R., Esq. *Longman and Co., Paternoster-row, E.C.*
- 1859 Reeve, John, Esq. *Conservative Club, S.W.*
- 1856 920 Reid, Henry Stewart, Esq. *Bengal Civil Service.*
- 1857 Reid, L. R., Esq. *Athenæum Club, S.W.; and 122, Westbourne-terrace, W.*
- 1830 \*Rennie, George, Esq., C.E., F.R.S., Hon. M.R.I.A. 21, *Whitehall-place, S.W.; and Holmwood-lodge, near Dorking, Surrey.*
- 1840 \*Rennie, Sir John, C.E., F.R.S., F.S.A. 54, *Spring-gardens, S.W.*
- 1834 \*Rennie, M. B., Esq., C.E. 21, *Whitehall-place, S.W.*
- 1830 \*Renouard, Rev. George Cecil, B.D., M.R.A.S. *Srainscombe-rectory, near Dartford.*
- 1830 \*Renwick, Lieutenant, R.E.
- 1858 Reynardson, Henry Birch, Esq. *Adwell, near Tetsworth, Oxfordshire.*
- 1857 Richards, Capt. George H., R.N. *H.M.S. 'Plumper,' Pacific; and Torpoint, Cornwall.*
- 1830 930 \*Richardson, Sir John, R.N., M.D., C.B., F.R.S. *Lancrigg, Grasmere, Westmoreland.*
- 1853 \*Ripon, George Frederick, Earl of. 1, *Carlton-gardens, S.W.; and Putney-heath, Surrey, S.W.*

# List of Fellows of the

Year of  
Election.

- 1830 \*Robe, Colonel Fred. Holt, C.B. *United Service Club, S.W.; and Woolwich-common, S.E.*
- 1830 \*Robinson, Captain Charles G., R.N. 16, *Delamere-ter., Upper Westbourne-terrace, W.*
- 1859 Robinson, Capt. D. G. *Staff of the Great Trigonometrical Survey, Rawul Pindé, Punjab.*
- 1859 Robinson, Sir Hercules G. P. *Governor of Hong Kong.*
- 1855 Robinson, Thos. Fleming, Esq., F.L.S. 4, *Grove-park-terrace, Camberwell-grove, S.*
- 1850 \*Robinson, Walter F., Esq., Lieut. R.N. *Junior United Service Club, S.W.*
- 1856 Roche, Antonin, Esq. *Educational Institute, Cudogan-gardens, Sloane-st., S.W.*
- 1830 \*Rodd, James Rennell, Esq. 40, *Wimpole-street, W.*
- 1830 940 \*Roget, Peter Mark, Esq., M.D., F.R.S. 18, *Upper Bedford-place, Russell-square, W.C.*
- 1834 \*Rose, the Right Hon. Sir George, F.R.S., LL.D. 4, *Hyde-park-gardens, W.; and 25, Southampton-buildings, Chancery-lane, W.C.*
- 1857 \*Rose, Wm. A. Esq., Alderman. 63, *Upper Thames-street, E.C.; and Befions, Crawford.*
- 1830 Ross, Charles, Esq. 60, *Portland-place, W.*
- 1857 Ross, John, Esq., M.A. 2, *Brabant-court, Philpot-lane, E.C.*
- 1844 \*Rosse, William, Earl of, M.A., F.R.S. *Birrcastle, Parsonstown, King's County, Ireland.*
- 1839 \*Rous, Vice-Admiral the Hon. Henry John. 23, *Grafton-street, Bond-street, W.*
- 1859 Rowden, Rev. G. Croke. *Oak Lawn, Weybridge.*
- 1856 Rucker, J. Anthony, Esq. *Blackheath, S.E.*
- 1858 \*Russell, Arthur John Edward, Esq., M.P. 2, *Audley-square, W.*
- 1830 950 \*Russell, Jesse Watts, Esq., D.C.L., F.R.S. *Ham-hall, Staffordshire.*
- 1830 Russell, Lord John, M.P., F.R.S. 37, *Chesham-place, S.W.; Pembroke-lodge, Richmond, S.W.; Endsleigh-house, Devon; and Gart-house, near Callandar, N.B.*
- 1857 \*Ryder, Captain Alfred P., R.N. *United Service Club, S.W.; and Launde Abbey, Uppingham.*
- 1858 Ryder, John Northcote, Esq. *Calvert and Co., Brewery, Upper Thames-street, E.C.*
- 1852 Sabine, Major-General Edw., B.A., V.P.R.S., F.R.A.S., &c. &c. 13, *Ashley-place, Victoria-street, Westminster, S.W.; and Woolwich, S.E.*
- 1847 St. Asaph, Thomas Vowler Short, Bishop of. *Palace, St. Asaph, North Wales.*
- 1857 St. David's, Connop Thirlwall, Bishop of. *Abergully Palace, Carmarthen. -*
- 1840 St. Leger, Anthony B., Esq. 10, *Berkely-square, W.; and 22, Baker-street, Portman-square, W.*
- 1857 St. Vincent, Edward, Viscount. *Meaford Stone, Staffordshire.*
- 1845 \*Salomons, David, Esq., M.P., Alderman, F.R.A.S. 3, *Great Cumberland-place, Hyde-park, W.; and Broom-hill, near Tunbridge Wells.*
- 1852 960 Saumarez, Captain Thomas, R.N. *Army and Navy Club, S.W.; and Green-hill, Barnet, N.*
- 1838 Scarlett, Major-General the Hon. Sir J. Yorke, K.C.B. *Portsmouth.*

Year of  
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- 1851 Scarlett, Lt.-Col. the Hon. W. F., Scots Fusilier Guards. 70, *Jermyn-st., S.W.*
- 1854 Slater-Booth, George, Esq., M.P., M.A. 15, *New-street, Spring-gardens, S.W.*
- 1855 Scott, Rear-Admiral James, C.B. *United Service Club, S.W.*
- 1840 \*Scrivener, J. F. P., Esq. 20, *Bryanston-square, W.*; and *Ramridge-house, near Andover, Hants.*
- 1830 \*Sedgwick, the Rev. A., Woodwardian Lecturer, M.A., F.R.S. *Athenæum Club, S.W.*; and *Cambridge.*
- 1858 \*Serocold, Charles P., Esq. *Brewery, Liquorpond-street, E.C.*
- 1853 Sevin, Charles, Esq. 11, *Cullum-street, E.C.*
- 1853 Sewell, Henry, Esq. 75, *Old Broad-st., E.C.*; and *Stamford-hill, N.*
- 1853 970 Sexton, George, Esq., M.D., PH. DR. 3, *Broughton-place, Hackney-road, E.*
- 1858 Seymour, George, Esq. 17, *Gracechurch-street, E.C.*; and 11, *Leinster-gardens, Hyde-park, W.*
- 1855 Seymour, Admiral Sir Geo. F., K.C.B., G.C.H. 115, *Eaton-square, S.W.*
- 1853 \*Seymour, Henry Danby, Esq., M.P. 39, *Upper Grosvenor-street, W.*; *Knoyle-Hendon, Wilts.*; and *Glastonbury, Somersetshire.*
- 1854 \*Shadwell, Captain Charles F. A., R.N., C.B. *H.M.S. 'Highflyer';* and *Army and Navy Club, S.W.*
- 1856 Share, James Masters, Esq., R.N. *H.M.S. 'Calcutta,' East Indies.*; and *Front-street, Tynemouth, Northumberland.*
- 1858 Shea, John, Esq., M.D., Surgeon R.N. 84, *Blackfriars-road, S.*
- 1846 Sheffield, George A. F. C., Earl of. 20, *Portland-place, W.*; and *Sheffield-park, Sussex.*
- 1857 Sheil, Sir Justin, K.C.B. 13, *Eaton-place, Belgrave-square, S.W.*
- 1857 Shelburne, Henry, Earl of. *Lonsdowne House, Berkeley-square, W.*
- 1857 980 Sherrin, J. S., Esq., LL.D. *Grammar School, Stowmarket.*
- 1859 \*Sherwill, Capt. W. S., F.G.S. *Professor of Surveying, Civil Engineering College, Calcutta.*
- 1858 \*Shipley, Conway M., Esq. *Army and Navy Club, S.W.*; and *Raheny, Dublin.*
- 1856 Shuttleworth, Sir J. P. Kay, Bart. 38, *Gloucester-square, W.*; and *Gaerthorp-hall, Burnley, Lancashire.*
- 1852 Silk, John Alexander, Esq. 9, *Adelphi-terrace, W.C.*; and *Southwood-lane, Highgate, N.*
- 1859 \*Silver, Stephen Wm., Esq. 66, *Cornhill, E.C.*; and *Norwood Lodge, Lower Norwood, S.*
- 1853 Silver, William, Esq., M.A., Barrister-at-Law. *Addison-road, Kensington, W.*
- 1853 Simmons, Edward R., Esq., Barrister-at-Law. 13a, *North Audley-street, W.*
- 1848 †Simmons, Colonel John L. A., R.E., C.B. *H. B. M.'s Consul, Warsaw.*; *Junior United Service Club, S.W.*
- 1853 Simpkinson, Lieut. Francis G., R.N. 55, *Victoria-street, Westminster, S.W.*
- 1857 990 Simpson, Sir George (Governor-in-Chief, Rupert Land). *Leschima, Canada East.*
- 1855 \*Simpson, John, Esq., M.D., R.N. 40, *Charing-cross, S.W.*
- 1857 Sitwell, Major W. H. *Junior United Service Club, S.W.*; and 4, *Devonshire-terrace, Hyde-park, W.*
- 1858 Skelmersdale, Edward, Lord. *Lattom-park, Ormskirk, Lancashire.*

Year of  
Election.

- 1855 Smith, Rev. Brownrigg, M.A. *Shepherd-lane, Brixton, S.*
- 1836 \*Smith, Edward Osborne, Esq., F.S.A., &c. *24a, Bryanston-square, W.*
- 1853 †Smith, George, Esq. *Peru.*
- 1857 Smith, George R., Esq. *73, Eaton-square, S.W.; and Telsden-park, Surrey.*
- 1857 \*Smith, Horace, Esq. *Sacombe-park, Ware, Herts.*
- 1890 \*Smith, James, Esq., F.R.S.L. & E. *Athenæum Club, S.W.; and Jordan-hill, Glasgow.*
- 1836 1000\*Smith, Lieut.-Col. James Webber, 95th Regt. *Royal Barracks, Dublin.*
- 1854 Smith, John, Esq., Memb. Geograph. Soc. Bombay. *7, Mincing-lane, E.C.*
- 1853 Smith, John Harrison, Esq. *Beckenham, Kent.*
- 1853 Smith, John Henry, Esq. *16, Pall Mall, S.W.; and Purley, Croydon, Surrey.*
- 1838 \*Smith, Octavius Henry, Esq. *Thames-bank, Westminster, S.W.*
- 1857 Smith, Captain Philip, Grenadier Guards. *39, Berkeley-square, W.*
- 1839 Smith, Rev. R. Carter. *Charlton Rectory, S.E.*
- 1841 \*Smith, Thomas, Esq.
- 1857 Smith, Wm. Gregory, Esq. *Hudson Bay Company, Fenchurch-street, E.C.*
- 1859 Smith, William Henry, Esq. *1, Hyde-park-street, W.*
- 1837 1010\*Smyth, Captain William, R.N. *Conway House, Ryde, Isle of Wight.*
- 1830 \*Smyth, Vice-Admiral William Henry, K.S.F., D.C.L., F.R.S., V.P.S.A., F.R.A.S., Hon. M.R.T.A., Corr. Inst. Fr., &c. &c. *Athenæum Club, S.W.; and St. John's-lodge, near Aylesbury, Bucks.*
- 1850 \*Smythe, Lieut.-Colonel William J., R.A. *2, Craig's-court, Charing-cross, S.W.*
- 1839 \*Somers, Charles. Earl. *Eustnor-castle, Herefordshire; and The Priory, Reigate, Sussex.*
- 1858 \*Some, Joseph, Esq. *Stratford, Essex, E.*
- 1855 Sopwith, Thomas, Esq., M.A., C.E., F.R.S. *43, Cleveland-sq., Hyde-park, W.; and Allenheads, Haydon-bridge, Newcastle-on-Tyne.*
- 1845 \*Sotheby, Lt.-Col. Frederick S., C.B., F.R.A.S. *3, Portugal-street, Mount-street, W.*
- 1858 Sotheby, Samuel Leigh, Esq. *The Woodlands, Norwood, S.*
- 1853 Southey, Henry Sedgfield, Esq., Barrister-at-Law. *Athenæum Club, S.W.*
- 1857 \*Speke, Capt. J. H. *Jordans, Ilminster, Somerset.*
- 1857 1020Spence, H. Donald M., Esq., F.G.S. *42, Hyde-park-sq., W.; and Reform Club, S.W.*
- 1830 \*Spottiswoode, A., Esq. *New-street-square, Fetter-lane, E.C.*
- 1855 \*Spottiswoode, William, Esq., F.R.S. *12, James-street, Buckingham-gate, S.W.*
- 1859 \*Spratt, Capt. Thos. A. B., R.N., C.B. *H. M. S. 'Medina,' Mediterranean.*
- 1857 Spring-Rice, Hon. S. E. (Deputy-Chairman of the Board of Customs). *Putney, S.W.*
- 1859 Stafford, Edward W., Esq. *Colonial Secretary of New Zealand.*
- 1853 Stanford, Edward, Esq. *6, Charing-cross, S.W.*
- 1855 Stanhope, Philip Henry, Earl, Pres. Soc. of Antiquaries. *3, Grosvenor-place-houses, Grosvenor-place, S.W.; and Chevening, Seven Oaks, Kent.*
- 1856 Staniland, William, Esq., C.E. *The Crescent, Selby, Yorkshire.*
- 1856 Stanley, Edmund Hill, Esq. *Craven Hotel, Strand, W.C.*
- 1853 1030\*Stanley, Edward Henry, Lord, M.P., D.C.L. *23, St. James's-square, S.W.*
- 1856 Statham, John Lee, Esq. *Catendish Club, Regent-street, W. [*

Year of  
Election.

- 1836 Staveley, Thomas, Esq. 20, *Earl-terrace, Kensington, W.*
- 1858 Staveley, Thomas G., Esq. *Foreign Office; and 24, Cambridge-street, Hyde-park, W.*
- 1850 Steele, Colonel Thomas M., C.B., Coldstream Guards. 36, *Chester-square, S. W.*
- 1830 \*Stephen, Sir George.
- 1855 \*Stephenson, Robert, Esq., M.P., F.R.S. 24, *Great George-street, Westminster, S. W.; and 34, Gloucester-square, Hyde-park, W.*
- 1857 Stephenson, Sir R. Macdonald, C.E. 115, *Gloucester-terrace, W.*
- 1854 Stevens, Frederic Perkins, Esq. *Melbourne, Australia.*
- 1855 Stevens, Henry, Esq., F.S.A. *Vermont-house, Camden-square, N. W.*
- 1841 1040 Stevenson, Thomas, Esq., F.S.A. 37, *Upper Grosvenor-street, W.*
- 1858 Stoddart, George, Esq. *H. B. M.'s Consul, Madeira.*
- 1845 \*Stokes, Capt. John Lort, R.N. *United Service Club, S. W.*
- 1858 Stopford, Capt. James J., R.N. 4, *Norfolk-crescent, Hyde-park, W.*
- 1858 Stopford, James Sydney, Esq. 18, *Savile-row, W.*
- 1858 Strangford, Percy Ellen, Viscount. 19, *Mansfield-street, W.*
- 1858 Stratford de Redcliffe, Stratford Canning, Viscount. 29, *Grosvenor-square, W.*
- 1853 Strutt, George H., Esq., F.R.A.S. *Bridgehill, Belper.*
- 1858 Strutt, Captain Hammel Ingold. *Examiner Royal Mail Steam Company, Southampton.*
- 1853 \*Strzelecki, Count P. E. de, C.B., F.R.S. 20b, *Savile-row, W.*
- 1859 1050 Stuart, Lieut.-Col. J. F. Dudley Crichton, M.P. 6, *Whitehall-place, S. W.*
- 1834 \*Sturge, Thomas, Esq. *Northfleet, Kent.*
- 1833 Sturt, Capt. Charles, F.L.S. *St. Edmond's, Tivoli, Cheltenham.*
- 1853 Stutfield, William, Esq. 15, *Leinster-terrace, Westbourne-terrace, W.*
- 1857 Sullivan, Captain Bartholomew J., R.N., C.B. *Board of Trade, S. W.*
- 1856 Sutherland, Kenneth L., Esq., Paymaster R.N., Barrister. *Junior United Service Club, S. W.; and 3, Mulgrave-place, the Hoe, Plymouth.*
- 1853 †Sutherland, Peter C., Esq., M.D. *Natol.*
- 1840 \*Sutherland, Robert, Esq.
- 1857 Swanzy, Andrew, Esq. 38, *Cannon-street, E.C.*
- 1857 \*Sweeting, Robert, Esq. 7, *Clement's-lane, Lombard-street, E.C.; and Harrow on the Hill.*
- 1836 1060 \*Swinburne, Rear-Admiral Charles H. 18, *Grosvenor-place, W.; and Capheaton, near Newcastle-upon-Tyne.*
- 1851 Sykes, Colonel William Henry, M.P., F.R.S., Hon. M.R.I.A. *Athenæum Club, S. W.; and 47, Albion-street, Hyde-park, W.*
- 1852 \*Syngé, Captain Millington H., R.E. *Newfoundland.*
- 1852 Tagart, Courtenay, Esq. *Reform Club, S. W.; and Paris.*
- 1857 \*Tait, Robert, Esq. 5, *Queen Anne-street, W.*
- 1856 Taylor, George Cavendish, Esq. *Army and Navy Club, S. W.*
- 1854 \*Taylor, John Stopford, Esq., M.D. 1, *Springfield, St. Anne-street, Liverpool.*
- 1857 Teesdale, John M., Esq. 9, *Norfolk-square, Hyde-park, W.*
- 1857 Tennant, Professor James. 149, *Strand, W.C.*

Year of Election.	
1859	Tennant, Major J. F., Bengal Engrs. Care of the Dpty. Survr.-General. <i>Calcutta.</i>
1830	1070*Thatcher, Colonel, E.I.C.
1854	Thomas, Henry Harrington, Esq. <i>Lansdowne-crescent, Bath.</i>
1859	Thompson, Thomas A., Esq. <i>London and County Bank, Cambridge.</i>
1854	Thompson, William C., Esq. 81, <i>Cambridge-terrace, Hyde-park, W.; and Royal Cork Yacht Club, Queenstown.</i>
1848	*Thomson, J. Turnbull, Esq. <i>Chief Surveyor, Otago, New Zealand.</i>
1854	*Thomson, Thomas, Esq., M.D. <i>Calcutta.</i>
1847	Thornton, Rev. Thomas Cooke, M.A., M.R.I. <i>Brock-hall, Northamptonshire.</i>
1858	Thorold, Rev. A. W. 16, <i>Bedford-square, W.C.</i>
1854	Thorold, Henry, Esq. 35, <i>Gloucester-square, W.</i>
1859	Thuillier, Major H. L., Superintendent of Revenue Survey of India. <i>Calcutta.</i>
1853	1080Tilleard, James, Esq. 17, <i>Scarsdale-terrace, Kensington, W.</i>
1834	*Tindal, Commr. Cha., R.N. <i>Branch Bank of England, Burlington-gardens, W.</i>
1846	*Tindal, Charles John, Esq. <i>New South Wales.</i>
1859	Tindal, Capt. L. Symonds, R.N. 1, <i>Pembroke-square, Bayswater, W.</i>
1839	*Tinne, John A., Esq. <i>Briarley, Aighurth, near Liverpool.</i>
1853	Tomline, George, Esq., M.P. 1, <i>Carlton-house-terrace, S.W.</i>
1853	*Tomline, George Taldy, Esq., F.S.A. 21, <i>Old-square, Lincoln's-inn, W.C.; and Ash, near Sandwich, Kent.</i>
1835	*Tooke, Arthur William, Esq., M.A. 39, <i>Bedford-row, W.C.; and Pinner-hill-house, near Watford, Middlesex.</i>
1856	Torrance, John, Esq. 5, <i>Chester-place, Hyde-park-square, W.</i>
1859	Townsend, Lieut. John, R.N. 11, <i>Burlington-street, Bath.</i>
1846	1090*Towry, George Edward, Esq. <i>Oakfield-lodge, East Cowes, Isle of Wight.</i>
1858	Towson, J. Thomas, Esq. <i>Secretary Local Marine Board, Liverpool.</i>
1858	Tracy, the Hon. Sudeley Charles G. H. <i>Guards Club, S.W.</i>
1859	Tremlett, Rev. Francis W., M.A. <i>Balsize Park, Hampstead, N.W.</i>
1870	Trevelyan, Sir Walter Calverly, Bart., M.A., F.S.A., F.L.S., F.R.S.N.A., &c. <i>Athenaeum Club, S.W.; Wallington, via Newcastle; and Nettlecombe, Somerset.</i>
1858	Trotter, Alexander, Esq. <i>Devonshire-place-house, New-road, N.W.</i>
1839	*Truman, Dr. Matthew. 40, <i>Norland-square, Notting-hill, W.</i>
1845	*Tuckett, Frederick, Esq. 4, <i>Mortimer-street, Cavendish-square, W.</i>
1852	Tudor, Ed. Owen, Esq., F.S.A. 46, <i>Westbourne-terrace, W.</i>
1857	Tudor, Henry, Esq. 46, <i>Westbourne-terrace, W.</i>
1834	1100*Turnbull, Rev. Thomas Smith, F.R.S. <i>University Club, S.W.; and Blofeld, Norfolk.</i>
1849	Twiss, Travers, Esq., D.C.L., F.R.S. 19, <i>Park-lane, W.</i>
1858	Twyford, A. W., Esq. <i>Bengal Cavalry; Reform Club, S.W.; and Clayton Walkers, Horstpierpoint, Sussex.</i>
1850	Tytler, Capt. W. Fraser. <i>Aldourie, Inverness.</i>
1854	*Uzielli, Matthew, Esq. <i>Hanover-lodge, Regent's-park, N.W.</i>
1858	*Uzielli, Theodosius, Esq. 114, <i>Piccadilly, W.</i>
1844	*Vacher, George, Esq. 29, <i>Parliament-street, S.W.</i>

Year of  
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- 1845 \*Vane, Lord Harry G., M.P. 1, *Grosvenor-place-houses, S. W.*
- 1858 Vardon, Arthur, Esq. 10, *Craven-hill-gardens, Hyde-park, W.*
- 1856 Vardon, Major Frank, 25th Madras Infantry. 10, *Craven-hill-gardens, Hyde-park, W.; and Madras.*
- 1857 1110 Vardon, Thomas, Esq. *Library, House of Commons, Palace, Westminster, S. W.*
- 1856 \*Vaughan, James, Esq., F.R.C.S., Bombay Army. *Bombay.*
- 1849 Vaux, William S. W., Esq., M.A., F.S.A. *British Museum, W.C.*
- 1852 \*Vavasour, Sir Henry M., Bart. *Travellers' Club, S. W.; and Spaldington-hall, Yorkshire.*
- 1855 Varasseur, James, Esq. 2, *De Crespigny-park, Denmark-hill, S.*
- 1837 \*Verney, Major Sir Harry C., Bart., M.P., F.R.A.S. *Travellers' Club, S. W.; 32, South-street, Grosvenor-square, W.; and Claydon-house, Bucks.*
- 1857 Verrey, Charles, Esq. *Switzerland.*
- 1852 Verulam, James Walter, Earl of. *Gorhambury, near St. Alban's; Barry-hill, Surrey; and Messing-hall, Essex.*
- 1859 Vesey, Arthur, Esq. *Long Ditton, Kingston, Surrey, S. W.*
- 1830 Vetch, Captain James, R.E., F.R.S. *Admiralty, S. W.*
- 1830 1120 \*Vidal, Rear-Admiral Alex. T. E. 10, *John-street, Adelphi-hill, W. C.*
- 1840 Vigne, G. T., Esq. *The Oaks, Woodford, N.E.*
- 1857 Vincent, John, Esq., Barrister-at-law. 4, *Lamb-buildings, Temple, E.C.*
- 1858 Vines, William Reynolds, Esq., F.R.A.S. *The Elms, Ealing, W.*
- 1838 \*Vyvyan, Sir R. Rawlinson, Bart., F.R.S. *Trelowarren, Cornwall.*
- 1857 Vyvyan, Richard H. S., Esq., F.R.A.S. *Conservative Club, S. W.; and Trewan, St. Colomb, Cornwall.*
- 1846 Wade, Sir Claude Marten. 16, *Queen-square, Bath.*
- 1852 Wade, Captain Mitchell B. 66, *St. John-street, Liverpool.*
- 1853 \*Wagstaff, William Racster, Esq., M.D., M.A. *Thornton-house, Clapham-road, S.*
- 1856 Waldegrave, the Hon. Geo. *Assis. Librarian House of Commons, 4, Harley-st, W.*
- 1846 1130 Walker, James, Esq., C.E., F.R.S. 23, *Great George-street, Westminster, S. W.*
- 1859 \*Walker, Major James, Bombay Engineers. *Murree, near Rawul Pindé, Punjab.*
- 1830 Walker, John, Esq., Hydrog. Hon. E.I.C. 9, *Castle-street, Holborn, W.C.*
- 1858 \*Walker, Captain John, H.M.'s 66th Foot. 13, *Westbourne-street, Hyde-park-gardens, W.*
- 1856 Walker, Joshua, Esq. 40, *Upper Harley-street, W.*
- 1853 Walker, Captain William Harrison, H.C.S. 103, *Gloucester-terrace, W.; and Board of Trade, S. W.*
- 1854 †Wallace, Alfred Russell, Esq. *Indian Archipelago.*
- 1858 Walrond, Theodore, Esq., M.A. 10, *Hereford-street, W.*
- 1853 Walter, Henry Fraser, Esq. *Papplewick-hall, near Nottingham.*
- 1853 \*Ward, George, Esq.
- 1859 1140 Warre, Arthur B., Esq. 54, *Lowndes-square, S. W.*
- 1851 Warre, John Ashley, Esq., M.P., F.R.S. 54, *Lowndes-square, S. W.; and West cliff, Ramsgate.*
- 1850 Washington, Capt. John, R.N., F.R.S. *Hydrographer to the Navy, Admiralty.*



Year of Election.	
1852	Watkins, John, Esq., F.R.C.S., F.S.A. 2, <i>Falcon-square, Aldersgate-street, E.C.</i>
1858	Watson, Josh. John Wm., Esq., C.E., PH. DR.
1853	Watts, J. King, Esq. <i>St. Ives, Huntingdonshire.</i>
1857	*Waugh, Lt.-Colonel Andrew Scott, Bengal Engineers, Surveyor-General and Superintendent Great Trigonometrical Survey. <i>India.</i>
1858	*Webb, Capt. Sydney. <i>Riversdale, Twickenham, S.W.</i>
1858	Webster, George, Esq., M.D. <i>Dulwich, S.</i>
1838	Wedderburn, Sir John, Bart., F.R.A.S. <i>Inveresk Lodge, Musselburgh.</i>
1851	1150 Weller, Edward, Esq. 27, <i>Duke-street, Bloomsbury, W.C.</i>
1853	*Wellington, Arthur Richard, Duke of, Major-General, D.C.L. <i>Apsley-house, W.; and Strathfieldsaye, Hampshire.</i>
1857	West, Lieut.-Col. J. Temple. <i>Benwick Lodge, Ryde, Isle of Wight.</i>
1853	Westmacott, Arthur, Esq. <i>United Mexican Mining Assoc., 5, Finsbury-circus, E.C.</i>
1852	†Westmacott, Lieut.-Col., R.M. <i>Junior United Service Club, S.W.</i>
1844	*Westminster, Richard, Marquis of. 33, <i>Upper Grosvenor-street, W.; Eaton-hall, Cheshire; and Motcombe-house, Dorsetshire.</i>
1857	Westminster, Richard C. Trench, Dean of. <i>Deanery, Westminster, S.W.</i>
1852	Weston, Alex. Anderdon, Esq., M.A. 18, <i>Rutland-gate, Hyde-park, S.W.</i>
1830	*Weyland, John, Esq., F.R.S. <i>Woodrising-hall, Norfolk.</i>
1858	Wheatley, G. W., Esq. 150, <i>Leadenhall-street, E.C.</i>
1859	1160 Wheelwright, William, Esq. 36, <i>Upper Bedford-place, W.C.</i>
1837	*Whewell, Rev. William, D.D., F.R.S., F.S.A., Vice-Chancellor, Cambridge. <i>Athenæum Club, S.W.; and Lodge, Cambridge.</i>
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Kart over den Norske Kyst, fra Arendal til Christiansand, 1854-55.

..... Christiansand til Lindesnæs, 1854. Christiania, 1856.

Two Maps of the South part of Norway, containing portions of the provinces of Buskerud and Bradsberg. Christiania, 1856.

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*Sweden.*

Admiralty Chart; Carlshamn, Matrik, and Jarnavik Harbours.

..... Gottland, Sheet V.

The HYDROGRAPHIC OFFICE.

Geologisk Karta öfver Fyris-Åns Dalbacken upprättad År 1856. With a pamphlet descriptive of the same. By Axel Erdman. The AUTHOR.

SPAIN AND PORTUGAL.—Admiralty Chart, Coast of Spain and Portugal, by Don V. Tofiño.

..... Coast of Spain, from the River Guadiana to Cape St. Martin.

..... Cape St. Martin to Cape de Creux.

..... Bay of Biscay, Ushant to Cape Finisterre. 2 sheets.

..... Coast of Portugal and Spain, Cape Finisterre to Cape St. Mary.

..... Coast of Spain, Fontarabia to the River Minho.

..... Coast of Spain and Portugal, River Minho to Cape Trafalgar.

..... and Morocco, leading to Straits of Gibraltar.

..... North Coast, Bay and Bar of Bilbao.

..... Bay of Gijon and Entrance to Barquero.

..... Inlet of Vares or Barquero.

..... Port Passages.

..... Saint Sebastian, Bay and Piers.

..... San Sebastian, Town and Port.

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.....	Santander Harbour.
.....	Santona Port.
.....	Santona Harbour.
.....	North-west Coast, Cedeira, Ribadeo and Vivero Ports.
.....	Cedeira Harbour.
.....	Corcubion Bay.
.....	Coruña Harbour.
.....	Ferrol, Coruña, and Betanzos Islets.
.....	Ferrol Harbour.
.....	Pontevedra Bay and River.
.....	Ría de Vigo.
.....	Ribadeo Port.
.....	Vigo Inlet.
.....	Vivero Port.
.....	South Coast, Cadiz.
.....	Cadiz Harbour.
.....	Bay of Algeiras or Gibraltar.

..... Gibraltar.

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.....	Côte d'Espagne, Entrée du Guadalquivir, 1857.
.....	Cours du Guadalquivir de son Embouchure à Seville. Sheets I., II., and III.
.....	Mouillages de Tarifa, Détroit de Gibraltar.

DÉPÔT DE LA MARINE.

PORTUGAL.—Admiralty Chart, Cape St. Vincent to River Guadiana.

.....	River Douro.
.....	River Tagus.
.....	Entrance and Harbour of Lisbon.

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.....	Côte de Portugal, Setúbal, levé en 1852, par M. C. A. Vincendon Dumoulin, &c. Scale $\frac{1}{150000}$ .
.....	Scale $\frac{1}{200000}$ .

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SWITZERLAND.—Carte Murale de la Suisse. Winterthur, 1858.

.....	Neue Karte der Schweiz, von J. M. Ziegler, Cor. F.R.G.S., and book containing an Alphabetical List of Places.
.....	Geographische Karte der Schweizerischen Gewerbsthätigkeit, von J. M. Ziegler, Cor. F.R.G.S. Winterthur, 1857.
.....	Index Map to the Government Survey of Switzerland.
.....	Karte des Cantons Zürich. Scale $\frac{1}{250000}$ . Winterthur, 1858.

Prof. J. M. ZIEGLER, Cor. F.R.G.S.

## BALTIC, MEDITERRANEAN, AND BLACK SEAS.

BALTIC.—Carte des Entrées et de la Partie Occidentale de la Mer Baltique, jusqu'à l'île d'Olund.

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..... by Don V. Tofiño.

..... Candia, N.W. end, Plan of Grabusa.  
..... Iviza and Formentera Islands, Coast of Spain.

..... Lipari and Vulcano Islands, Channels between. Views.

..... Lipari and Olivieri Bays.

..... Majorca and Carbera Islands.

..... Malta, Harbour and Fortifications of Valetta.

..... St. Paul's Bay.

..... Marsa Sirocco.

..... Minorca.

..... Port Mahon.

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By Capt. Spratt, R.N. (1 to 7*a* inclusive.) Duplicate. 1857.

..... Eight Maps of the Mouths of the Danube.

..... St. George's Mouth of the Danube.

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..... Plan des Passes de Kertch et d'Ienikalé.

..... Mouillage extérieur de Kinburn et l'Entrée du Limane du Dnieper.  
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ARABIA.—Admiralty Chart, South Coast, Kisseen Bay.

..... Maculla Bay.

..... Morebat Bay.

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..... Ground-plan and View of the Beit Allah, or Mosque, at Mecca.

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2 sheets. 1856.

..... Khiva, &c. Translated from Russian documents, by Lieut.-Col. T. B. Jervis, F.R.G.S. The late COLONEL JERVIS, F.R.G.S.

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..... Outer Bay.

..... Port Deans Dundas.

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..... Mouillage d'Alexandrette (Côte de Syrie).

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..... Syria, Eastern part South of Damascus. MS showing the route of Cyril Graham, Esq., F.R.G.S. 1857. The AUTHOR.

CHINA.—Admiralty Chart, China, Barracouta Harbour.

..... Canton River or Chu-Kiang from Macao to  
Canton, and the Western Branches to Sam-Shui.

..... Napoleon Road and Port, Gulf of Tartary.

..... Pecheli Gulf.

..... Port Michael Seymour.

..... St. John's Island, Shitoe Bay.

..... Tong-Hou Cove.

..... Yang-tse-Kiang, from the Sea to Nanking.

..... Cochín-China: Cam-Ranh, Nha-Trang, and Bin-Kang  
Bays.

..... Hon-Cohe and Coua-Bè Harbours.

..... Port Cou-mong.

..... Port Ongro.

..... Ports Xuan Daï, Vung-Lam, and  
Vung-Chao.

..... Quinhou or Quin Nhon Bay and Port.

..... Formosa and Bashee Islands. Views.

..... Hainan, Gallong or Gelang Bay.

..... Yu-lin-kan Bay.

..... Views on the Coast.

..... Loo-Choo, Napa-Kiang Roads.

..... Views on the Coast. 5 plates.

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..... Canton River, Canal nord de Lantao.

..... Canal sud de Lantao.

..... Macao, La Rade de Macao.

..... Tigris, L'Embouchure du Tigre.

DÉPÔT DE LA MARINE.

..... Canton, Plan of the City and Suburbs. Compiled by the Quartermaster-  
General's Department, Chinese Expeditionary Force, Oct. 1857.

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..... Chusan, Survey of the Island of; executed during the war of 1842-3, by  
Lieuts. T. de Havilland and E. W. Sargent. 1857.

..... Yang-tse-Kiang, in Chinese characters, showing the water communica-  
tion with that river. Two copies. Col. the Hon. A. H. GORDON, F.R.G.S.,  
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..... Malabar, do.

..... Cutch and Guzerat, do.

..... Angassee River.

..... Bancoot River, Bar and Entrance.

..... Belapore River.

..... Billiapattam River.

..... Bombay Island, Mayham.

..... Broach Bar and River.

..... Bulsaur and Omersary Rivers.

..... Chaoul, coast of Concan.

..... Choul, coast of Malabar.

..... Coromandel Coast. Views. Plate 2.

..... Cranganor, Malabar Coast.

..... Danno River.

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- ..... Diu Island.
- ..... Durmapatam, Malabar Coast.
- ..... Fort St. George, Coromandel Coast.
- ..... Gingerah or Donda Radjapore, Malabar Coast.
- ..... Goa, Malabar Coast.
- ..... Views in the vicinity.
- ..... Gundivee River.
- ..... Guzerat. Views on the Coast.
- ..... Jaffrabat, Guzerat.
- ..... Kyonk Phyou Harbour, Gulf of Bengal.
- ..... Malabar Coast, Bombay to Cnrwar Head.
- ..... part of the, and part of the Laccadives.
- ..... Views. 5 plates.
- ..... Manar, Views in the Gulf of.
- ..... Merjee River, Malabar Coast.
- ..... Nagore River and Bay.
- ..... Nunsaree River.
- ..... Radjapore River.
- ..... Rajapore and Nowa Bunder.
- ..... Rangoon River.
- ..... Salset Island, Manhora River.
- ..... Views.
- ..... Searbett Island and Chanch River.
- ..... Sinderdroo, or Melundy, Malabar Coast.
- ..... Tutacarine Coast. Views.
- ..... Vassava.
- ..... Vingorla, Malabar Coast.
- ..... Ceylon, East Coast, from River Singane to Point  
Pedro, including Trincomalee.
- ..... South Coast.
- ..... Views.
- ..... Batacalao Road.
- ..... Nyle or Nylewelle Bay.
- ..... Point de Galle Harbour.
- ..... Trincomalee Harbour.
- ..... and Bays.
- ..... Venloos Bay.

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INDIA, with a Plan of Delhi and its environs; also a small Map of the existing and proposed communications between England and the East. By A. K. Johnston, F.R.G.S. 1857.

..... based on the Surveys executed by order of the Hon. East India Company.  
1857. E. STANFORD, Esq., F.R.G.S.

..... Cawnpore. Rough Sketch of the Position of the Europeans at Cawnpore, from 5th to 27th June, 1857. By Captain Henry Yule, F.R.G.S.

The AUTHOR.

..... City and Environs of Cawnpore. By James Wyld, F.R.G.S.  
1858. The AUTHOR.

..... Cawnpore to Lucknow, Plan of the road from. Scale 2 in. to a mile.  
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..... View of Delhi and the surrounding Country. Drawn and lithographed by A. Maclure, F.R.G.S., from original native drawings, &c. 1857.    **E. STANFORD, Esq., F.R.G.S.**

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Colonel HENRY JAMES, R.E., F.R.G.S.

..... Lucknow, Plan of, showing the Position of the British Force under the command of Sir Colin Campbell, G.C.B. 1858.

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..... Sketch-map of the Residency and Palace at Lucknow. By James Wyld, F.R.G.S. 1857.    The AUTHOR.

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..... Laccadives, view.

..... Gulf of Bengal, Sheet VI., Chittagong, Kyonk Phyou, and Ramree.

..... Sheet VII. Negrais, Rangoon, and Martaban.

..... Sheet VIII., Tavoy and Mergui.

..... Sheet XII., Andaman Islands.

..... Cheduba Strait, and Ramree Road and Harbour.

..... Cocos or Keeling Islands.

..... Pulicat Shoals.

..... Andaman Islands, Ports Campbell and Chatham.

..... Port Cornwallis.

..... Port Meadows.

..... Strait between the Middle and South Islands.    The HYDROGRAPHIC OFFICE

..... Carte des Courants Généraux dans l'Océan Indien.

..... Routes dans l'Océan Indien.

..... Vents Généraux dans l'Océan Indien.

DÉPÔT DE LA MARINE.

**JAPAN.**—Admiralty Chart, Kuril Islands.

..... Tsugar Strait.

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..... Menam Chau Shya, or Bangkok River.

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The late Col. JERVIS, F.R.G.S.

ASIATIC ARCHIPELAGO.

Admiralty Chart, England to Hong Kong, through Sunda Straits.

..... Aiou or Yowl Islands.

..... Amboina Island.

..... Babuyanes, Port San Pio. Quinto, on the Island Camiguing.

..... Musa Bay.

..... Balabac, Dalawan Bay.

..... Balambangan, North Harbour.

..... Southern Harbour, or Looc See Koambo and  
Looc Seempool.

..... Bally and Lombock, Views in the Straits of.

..... Banca, Views. Plates 1 to 4.

..... Basseelan, Maloza Bay.

..... Batanes or Bashee Islands, Views.

..... Boero Island, Cajelie Bay.

..... Boeton, eastern part.

..... Borneo, East Coast, Views. 3 Plates.

..... Abai Harbour.

..... Malloodoo Bay.

..... Sandakan Harbour.

..... Borneo and the Sooloo Archipelago.

..... Carnicobar Island.

..... Celebes, South Coast.

..... Turatte and Bonthain Bays.

..... Gulf of Tomeenee, Gorontalo River.

..... West Coast.

..... Views along the Coast. 3 Plates.

..... Celebes Sea, eastern part.

..... Ceram, Bay Amahoy.

..... Bay of Salema and Harbour of Saway.

..... Wahaay Harbour.

..... Dampier Strait, Views of the Lands about. Plates 1 and 2.

..... Floris or Mangery, Alligator Bay.

..... Mangrove Harbour.

..... Geby Island.

..... Gillolo and Mortay, Views.

..... Good Fortune, three Bays on the Island.

..... part of the Islands of Pora, or Good Fortune,  
and Poggys, or Nassau.

..... Great Rydangh Island, Harbour on the south part.

..... Hog Island.

..... Honimoa, part of the Island.

..... Java, City of Batavia.

..... Limbe Strait.

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- Admiralty Chart, Luzon, Batangas Bay and Capa Luan.  
 ..... Chief Port on the Coast of Ylocos.  
 ..... Lampon Bay.  
 ..... Manilla Bay.  
 ..... Ports of Cavite and Mariveles.  
 ..... Port of Seeseeran.  
 ..... Port of Subec, near Manilla.  
 ..... and Babuyanes, north end, Views.  
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 ..... Strait, Views. 2 Plates.  
 ..... and along the North Coast of Celebes, Views.  
 ..... Magindanao, Bongo Bay.  
 ..... Kamaladan Harbour.  
 ..... Panguyl.  
 ..... Pollock Bay.  
 ..... Port Sta. Maria and part of the South Coast.  
 ..... Samboangan.  
 ..... Surigao Bay.  
 ..... Malacca Strait, Bass Harbour.  
 ..... Views. Plates 1 to 4.  
 ..... Malaya, East Coast, Blair Harbour.  
 ..... Mansillar Harbour, near Sumatra.  
 ..... Mindoro, Bay on West Coast, and Port Magarin on South end.  
 ..... Calapan.  
 ..... Palaon Bay, and Port St. Andries, on Island Marin-  
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 ..... and entrance of Manilla Bay, Views.  
 ..... Molucca Islands, Views. 2 Plates.  
 ..... Natunas, Anambas, and adjacent Islands, Views.  
 ..... Negros and Magindanao, Views.  
 ..... New Guinea, Great Bay, North-west Coast.  
 ..... part of the North-west Coast, &c.  
 ..... New Holland, Sumbawa, Lomboek, Bally, and Madura, Views.  
 ..... Nicobar Islands, Nancowry Harbour.  
 ..... Palawan Island.  
 ..... Palawan, Views on the Coast.  
 ..... Papra Strait, formed by the Island Salang and the Continent.  
 ..... Philippinas, Panay, Cuyos. Views.  
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 ..... Pitt's Passage, Views. 5 Plates.  
 ..... Poggy Islands, North Nassau or Poggy Island, Harbour of Se  
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 ..... South Poggy Island, Harbour on the East side.  
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 ..... and West Coast of Sumatra, Passage between.  
 ..... Poolo Batoo, North part.  
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 ..... Poolo Krakatore and Poolo Bezec, Passage between.  
 ..... Queda, Coast of, Boonting Islands.

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- Admiralty Chart, St. Bernardino Strait and parts adjacent.  
 ..... Sappi, Sumbawa, and Mangery, or Floris, Views in the Strait.  
 ..... Se Beero to North Poggy.  
 ..... Selang Harbour.  
 ..... Seuheli Islands and Reef.  
 ..... Siao and adjacent Islands north of Celebes, Views.  
 ..... Singapore Strait, Views.  
 ..... Sooloo Archipelago.  
 ..... or Mindoro Sea, eastern part.  
 ..... Solor, part of the Straits of.  
 ..... South Natunas, Royalist Haven.  
 ..... Sumatra, West Coast, Ayer Bongy.  
 ..... Bencoonat Bay.  
 ..... Billimbing Bay.  
 ..... Cawoor or Sambat.  
 ..... Indrapore Point to Padang River.  
 ..... Island of Engano.  
 ..... Padang.  
 ..... Passage between the Islands of Great  
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 ..... Poolo Pisang Harbour and Croe Roads.  
 ..... Priaman and the Ticoo Islands.  
 ..... S. Leaga Bay.  
 ..... Tappanooly Harbour.  
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 ..... East Coast, Palumbang River.  
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 ..... Sunda Strait, Mew Bay.  
 ..... Surigao Passage, Views, 2 plates.  
 ..... Tavoy Island, Port Owen.  
 ..... Ticao, St. Jacinto.  
 ..... Trieste Island.  
 ..... Tsiompa, Ilanran Bay.  
 ..... Underoot Island.  
 ..... Waygiou, Offak and Piapio Harbour.  
 ..... Rawak Harbour.  
 ..... Zutphen or Hounds Islands, South-East Coast of Sumatra.

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- BANCA.—Carte du Déroit de Banca (Iles de la Sonde). DÉPÔT DE LA MARINE.  
 BORNEO —A MS. tracing of the River Limbong, near Bruni. By Lieut. C. C. de  
 Crespigny, R.N., F.R.G.S.  
 JAVA, Chart of the Island, on 4 sheets. By Dr. F. Junghuhn. 1855.

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- ..... Reede van Batavia, Kaart van de vaarwaters naarde. Uitgegeven door  
 Jacob Swart. Amsterdam, 1858.  
 KARIMATA PASSAGE, Vaarwater tusschen Bornéo en Sumatra, door Jacob Swart.  
 Amsterdam, 1858. CHEVALIER JACOB SWART, CORR. F.R.G.S.

*AFRICA.*

- African Pilot, from the Straits of Gibraltar to Cape Negro, including the Atlantic  
 and Southern Oceans, 1806.  
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..... Damiette to El-Arish.  
..... Suez Bay. The HYDROGRAPHIC OFFICE.

..... Cape Spartel, Baie Jeremias, le Phare et le Newton.

..... Côtes d'Afrique, Agadir ou Saneta Cruz.

..... Dar-el-Beida ou Casa Blanea.

..... Maroc, Rade de Larache, 1857.

..... Mazaghan, 1856.

..... Mogador, levé en 1852, par MM. C. A. Vincendon-Dumoulin, &c.  
Paris, 1856.

..... Rabat et Salé, 1856.

..... Safi, 1856.

..... Tanger et ses Atterrages.

..... levés en 1854 et 1855, par MM. C. A.  
Vincendon Dumoulin et C. P. de Kerhallet. Paris, 1857.

..... Tétouan (Maroc).

..... Tripoli, Plan du Port de Tripoli, de Barbarie.

..... Côtes nord du Maroc, 1857. DÉPÔT DE LA MARINE.

..... Carte de l'Itinéraire d'El-Oned à R'Dâmes, dressée d'après les  
esquisses de MM. les Capitaines De Bonnemain et Robert; par V. A.  
Malte-Brun, Corr. F.R.G.S. 1857. The AUTHOR.

..... Suez; Carte de l'Isthmus de Suez. Par Linant Bey et Mongel Bey.  
M. FERDINAND DE LESSEPS.

**EASTERN.**—Admiralty Chart, Quilimane River, the northern branch of the Zam-  
besi. The HYDROGRAPHIC OFFICE.

..... Zambesi; a tracing of the River Zambesi from Senna to Canrabassa,  
by Mr. Consul M'Leod, from a plan in the possession of Major Sicard, Go-  
vernor of Tete, by Dr. Wilhelm Peters. 1846.

..... a tracing of the River Zambesi, from Quilimane to Senna.  
1857. Mr. Consul M'LEOD.

**SOUTHERN.**—Map of Africa, from the Equator to the Southern Tropic, showing  
the routes to Lake Nyassi, Moenemoezi, the Muropue, the Cazembe, and  
across the Continent, &c. By W. D. Cooley, F.R.G.S. 1853. Two copies.  
The AUTHOR.

..... Admiralty Chart, Algoa Bay.

..... Port Natal. The HYDROGRAPHIC OFFICE.

..... Eastern Provinces of the Cape Colony, with part of the Orange Free  
State, &c. By H. Bolus. Ang. 1857. Dr. NORTON SHAW.

..... Harrismith and Magaliesberg, a tracing of a sketch of part of the  
country between, traversed and drawn in 1851-2. By John Sanderson.  
Natal, 1852.

..... Kai 'Carip, or Great Orange River, from Eis to Pella. By R. Moffat,  
jun., Govt. Surveyor. Kuruman, Jan. 1857.

..... Little Namaqualand and Great Bushmanland. By R. Moffat, jun.,  
Govt. Surveyor. Little Namaqualand, April, 1856.

The AUTHOR, through the COLONIAL OFFICE.

**WESTERN.**—Admiralty Chart, Cameroon River, corrected.

..... Ceuta, Town of.

..... Lagos River.

..... Cape Verd, Island of St. Antonio, Tarrafal Bay.

..... St. Jago, Porto Praya.

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..... Sal, Mordeira Bay.

..... Madeiras, Salvage Islands.

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..... Bijouga Islands, Tracing of the Admiralty Chart, Sheet 3, showing the route of His Excellency Col. O'Connor, C.B., F.R.G.S.

..... Tracing of the River Kitafing, near the Bijouga Islands, showing the route of His Excellency Col. O'Connor, C.B., F.R.G.S.

The AUTHOR, through the COLONIAL OFFICE.

..... Côte occidentale d'Afrique, partie comprise entre le Senegal et la Cap Roxo.

..... Cazamance et Sierra Leone.

..... Cap Sierra Leone et le Cap des Palmes.

..... Cap des Palmes et le Cap Coast.

..... Cap Coast et le Fleuve Niger.

DÉPÔT DE LA MARINE.

..... Niger, MS. plan. By Beecroft. JAMES MACQUEEN, Esq., F.R.G.S.

AMERICA.

NORTH AMERICA.—Admiralty Chart, East Coast, Cape Breton to Nova Scotia.

..... New York to Cape Hatteras.

..... Cape Hatteras to Cumberland Sound.

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BRITISH NORTH AMERICA.—Admiralty Chart, Labrador and Greenland, including the North-West Passages.

..... Labrador, from Cape Charles to Sandwich Bay.

..... Passages into Sandwich Bay.

..... Sealing Bight and St. Francis Harbour.

..... Newfoundland, from Trinity Harbour to Cape Freels.

..... Cape Freels to Point Partridge.

..... Point Lance to Cape Spear.

..... Northern part of the Island and the Straits of Belle Isle.

..... Barrow Harbour, Bonavista Bay.

..... Bonavista Bay, North-West arm.

..... Braha Harbour.

..... Cape Rouge Harbour.

..... Change Islands

..... Goose Cove, Cremallire and

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BRITISH NORTH AMERICA.—Admiralty Chart, Newfoundland, Croque Harbour.	Cutwell Harbour.
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.....	..... Harbour.
.....	Fortune Harbour.
.....	Funk Island.
.....	Griguet and Camels
Bays.	.....
.....	Harbour Grace, in
Conception Bay.	.....
.....	How Harbour, Hare
Bay.	.....
.....	La Scie Harbour.
.....	Nipper's Harbour.
.....	Paquet Harbour.
.....	Placentia Bay.
.....	..... Little
Southern Harbour.	.....
.....	St. Anthony Har-
bour.	.....
.....	St. John's Town
and Harbour.	.....
.....	St. Lunaire Bay,
North-East Coast.	.....
.....	St. Pierre Island
Port.	.....
.....	Toulinguet Har-
bour.	.....
.....	Trinity and Con-
ception Bays.	.....
.....	Triton Harbour.
.....	Virgin Rocks, and
the surrounding Banks.	.....
.....	Nova Scotia, Coast of, Sheets 2, 3,
4, 5, 6, 9, 10, 11.	.....
.....	Baccaro Point to
Pubnico Harbour.	.....
.....	Pubnico to Yar-
mouth.	.....
.....	Green Island to Cape
Canso.	.....
.....	Cape Canso to Dover
Head.	.....
.....	Bay of Fundy, Sheets
1 and 2.	.....
.....	to Long
Island.	.....
.....	Grand
Manan Island, with the adjacent Islands and Dangers.	.....
.....	Grand
Manan, Passamaquoddy Bay, &c.	.....
.....	Gulf of St. Lawrence, Ellis Bay
Island of Anticosti.	.....

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**BRITISH NORTH AMERICA.**—Admiralty Chart, Gulf of St. Lawrence, Little Natashquan Harbour.

..... Quebec,  
Harbour and Basin.

..... Queen Charlotte Island, Plans of  
Ports.

..... Vancouver Island to Cordova Bay.  
..... Nanaimo Har-  
bour and Knox Bay.

The HYDROGRAPHIC OFFICE.

**CANADA.**—Map of the North-West part of Canada, Indian Territories, and Hudson Bay. Compiled and drawn by Thomas Devine, Provincial Land Surveyor, &c. Toronto, March, 1857. The AUTHOR, through Mr. A. R. ROCHE.

**CANADA WEST, or UPPER CANADA;** compiled from the most recent authorities, surveys, &c. Canada Company's Office, Toronto, July, 1855.

F. NARES, Esq., F.R.G.S.

**NEWFOUNDLAND.**—Baie du Cap Normand et du Havre de Cook.

..... Baie du Sacre.

..... Havre de Lark, situé dans la Baie de Iles.

..... Havre de Petit-port et ses environs.

..... Havre de Port-au-Choix.

..... Havres de Saint-Julien et des Grandes Oies.

..... Plan de la partie nord-est de l'Île de Kirpon.

DÉPÔT DE LA MARINE.

**ST. LAWRENCE.**—Maps, Reports, and Estimates relative to Improvements of the Navigation of the River St. Lawrence, and the proposed Canal to connect it with Lake Champlain. Toronto, 1856. Capt. M. B. WADE, F.R.G.S.

**STURGEON RIVER.**—A Tracing of a Sketch-Map of the Lakes on the Sturgeon River, Upper Sturgeon Lake, Hudson Bay Company's Territories. By Capt. John Palliser, F.R.G.S.

**WHITE FISH RIVER.**—A Tracing of a Sketch-Map of the White Fish River, on the Kaministiquia River, Fort William. By Capt. John Palliser, F.R.G.S.  
June, 1857. The AUTHOR.

### UNITED STATES.

Admiralty Chart. Algier Port.

..... Apalachicola Bay, Florida East Coast.

..... Block Island to Great Egg Harbour.

..... Chesapeake River.

..... Connecticut River and New London.

..... Country Harbour.

..... Florida West Coast, from Sawaney River to 94° 20' W.,  
4 sheets.

..... Mistanoque Harbour.

..... Monomy.

..... Muskeget Channel.

..... Nantucket Shoals and Bass River.

..... New Haven, Black Rock, and Bridgeport Harbours.

..... New York Harbour.

..... Oyster, or Syosset, and Huntingdon Bays.

..... Plymouth.

..... Portland and its approaches.

..... Portsmouth Harbour.

..... San Francisco Harbour.

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**CÔTE D'AMÉRIQUE, ÉTATS-UNIS, Canal d'Hatteras.**

- ..... Détroit de l'Île des Péchenrs.
- ..... Embouchure de la Rivière Sabine.
- ..... Entrée de la Delaware.
- ..... Rivière du Cap Fear.
- ..... Mouillage du Cap Hatteras.
- ..... New York.
- ..... Port Edgartown.
- ..... Port de Hyannis.
- ..... et Île de Nantucket.
- ..... Port of New Bedford.
- ..... New Haven.
- ..... New London.
- ..... Refuge de Little Egg.
- ..... Rivière de la Delaware.

**BRAZOS AND BIG WITCHITA RIVERS**, Map of the Country upon the ; explored in 1854, by Capt. R. B. Marcy, U.S.A. Philadelphia, 1854. The AUTHOR.

**FLORIDA**.—Military Map of the Peninsula of Florida, South of Tampa Bay. Compiled by Lieut. J. C. Ives, U. S. Top. Engineers. New York, April, 1856. The AUTHOR.

**MADISON and the Four-Lake Country**. Scale 1 in. =  $\frac{3}{4}$  mile. 4 copies. Dane and Co. Wisconsin, 1857.

....., the Capital of Wisconsin. Scale 10 in. = 1 mile. Dane and Co. Wisconsin, 1857. The HISTORICAL SOCIETY of WISCONSIN.

**MICHIGAN LAKE**.—Graham, Lieut.-Col. J. D., Superintending Engineer. Chicago Harbour and Bar Illinois. Scale 1 in. = 200 feet, 3 copies. Chicago, Nov. 15, 1856.

..... Grand River Harbour, including part of the town of Grand Haven. Scale 1 in. = 200 feet. Chicago, Nov. 15, 1856.

..... Manitowoc Harbour, Wisconsin. Scale 1 in. = 200 feet. Chicago, Nov. 15, 1856.

..... St. Joseph Harbour. Scale 1 in. = 200 feet. Chicago, Nov. 15, 1856.

..... Sheboygan Harbour, Wisconsin. Scale 1 in. = 200 feet. Chicago, Nov. 15, 1856. Lieut.-Col. J. D. GRAHAM, U.S.A.

**PACIFIC RAILWAY**.—Map of Routes for a Pacific Railway, compiled by G. K. Warren, Lieut. Top. Engineers. Scale 1—600,000. New York, 1855. The AUTHOR.

**WISCONSIN**.—Township Map of the State of Wisconsin, showing the Milwaukee, Watertown, and Madison Railroad. Scale 1 in. = 4 miles. J. H. Colton and Co. New York, 1857. The HISTORICAL SOCIETY of WISCONSIN.

**MEXICO**.—Atlas Geográfico, Estadístico, é Histórico de la Republica Mexicana.

No. 1. Carta General de la Republica Mexicana.

- 7. San Luis Potosi.
- 16. México (Estado de).
- 17. Do. (Valle de).
- 18. Puebla.
- 19. Vera Cruz.
- 23. Tabasco.
- 27. Colima.
- 29. Tehuantepec.

His Excellency GENERAL ALMONTÉ, Mexican Minister.



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Admiralty Chart, Central America, West Coast of Mexico, &c.

..... Port San Blas.

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GOLFE DU MEXIQUE, CÔTE DES ÉTATS UNIS, Banc de la Floride, Pie O. et E.

..... Mouillage du Cap Canaveral.

..... Caye de l'Ouest.

..... Passe Caballo.

DÉPÔT DE LA MARINE.

..... Côte de Mexique, Rivière de Tampico.

DÉPÔT DE LA MARINE.

VERA CRUZ, Port of, and Anchorage of Anton Lizardo. From Spanish printed plans, with additions by Captain Sir J. Phillimore, R.N., C.B. 1824.

JAMES MACQUEEN, Esq., F.R.G.S.

CENTRAL AMERICA AND WEST INDIES.

Admiralty Chart, Central America, Sheets 3 and 4, corrected to 1856.

..... East Coast, Icaicos Road.

..... Greytown, corrected to 1856.

..... Honduras, Belize Harbour.

..... West Indies and the Gulf of Mexico, describing the Gulf and Windward Passages, &c. Sheets I., II., and III.

..... Bahamas, Anguilla Island, Cay Sal Bank.

..... Western Elbow.

..... Caicos Bank, Cockburn Bank.

..... Douglas Road, east of New Providence.

..... Man of War Cay Anchorage.

..... New Providence, the Fleeming, or Six Shilling Canal.

..... Pelican and Little Harbours.

..... Turk Island, Hawk's Nest Anchorage.

..... Whale Cay and Green Turtle Cay.

..... Bahama Bank, Highborne Cut.

..... Keys and Shoals in the Mira-por-Vos Passage.

..... Wax Cay Cut, Exuma Sound.

..... Barbadoes Island.

..... Carlisle Bay.

..... Bequia Island, Admiralty Bay.

..... Bermuda Islands.

..... Carriacou Island, Hillsborough Bay.

..... Cuba, North Coast, Anchorage formed by Piedras, Mono, and Monillo.

..... Bahia Hondu.

..... Port Banes.

..... Port of Baracoa.

..... Port Bariai.

..... Port Cabonica and Livisa.

..... Port of Cananova.

..... Porto de Cavanias.

..... Port of Cayo Moa.

..... Port of Cayaguanique.

..... Port of Cebollas.

..... Port Gibara.

*Maps, Charts, &c.*

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Admiralty Chart, Cuba, North Coast, Port of Jaragua.

.....	Port Jururu.
.....	Port of Manati.
.....	Port of Maravi and Navas.
.....	Port Mariel.
.....	Port of Mata.
.....	Port of Matanzas.
.....	Port Naranjo.
.....	Port of Nipe.
.....	Port of Nuevas Grandes.
.....	Puerto de la Nuevitas.
.....	Port Padre.
.....	Port Sama.
.....	Port of Taco.
.....	Port of Tanamo.
.....	Port de Vita.
.....	Port of Yaguanique.
.....	South Coast, Port of Baitiqueri.
.....	Port of Escondido.
.....	Cuba, South Coast, Port of Guantanamo.
.....	Port of Jagua.
.....	Port of St. Jago de Cuba.
.....	Isle of Pines and adjacent Coast.
.....	Florida and Providence Channels, part of.
.....	Grand Cayman Island.
.....	Jamaica.
.....	Anchorage at Blewfields.
.....	Anchorage at Savanna la Mer.
.....	Channels leading to Port Royal and Kingston.
.....	Green Island Harbour.
.....	Martha Bay.
.....	Montego Bay.
.....	Morant Bay.
.....	Morant Cays.
.....	Mosquito Cove.
.....	Old Harbour, Long Wharf, &c.
.....	Port Antonio.
.....	Port Morant.
.....	St. Ann's Bay.
.....	St. Lucea Harbour.
.....	Leeward Islands, Port El Roque.
.....	Margarita Island, Bays of Panupater and Port Moreno, and Port of Laguna Grande del Obispo.
.....	Mariagalante, West side.
.....	Martinique, Bay of Trinity.
.....	Cul de Sac, Marin.
.....	Fort Royal Bay.
.....	Grande and Petite Anse d'Arlet.
.....	Town of St. Pierre.
.....	Narrows between St. Kitt's and Nevis.
.....	Navassa Island, between St. Domingo and Jamaica.

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Admiralty Chart,	Old Providence Island and Catalina Harbour.
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.....	Puerto Rico, Port San Juan.
.....	Saba Island.
.....	Saintes, plan of the.
.....	St. Domingo, Bay of Aquin.
.....	Aux Cayes.
.....	Cayemites and Buradaires.
.....	Flamand.
.....	Fort Dauphin.
.....	Gonaives.
.....	Mancenille.
.....	St. Louis, and Meste.
.....	St. Mark.
.....	Harbour of Jacmel.
.....	Lacul.
.....	Port au Prince.
.....	Mole of St. Nicholas.
.....	Prince Rupert Bay.
.....	Puerto de Plata.
.....	St. Lucia, Gros Inlet Bay.
.....	Port of Castries, or le Carenage.
.....	St. Vincent, Town and Bay of Kingston.
.....	Sombrero Island.
.....	Tobago Island, Great Courland Bay.
.....	Tortugas and Florida Cays, or Martyrs. 3 sheets.
.....	Virgin Islands, Sheet III.

*The HYDROGRAPHIC OFFICE.*

CENTRAL AMERICA, compiled from materials furnished by the Committee on Foreign Relations. Scale, 1: 2,500,000. By Capt. W. R. Palmer, U.S. Top. Engineers. New York, March, 1856.

*The AUTHOR*

CUBA, Island of. 3 sheets. Hydrographic Office, Madrid, 1821-36-37.

JAMES MACQUEEN, Esq., F.R.G.S.

GOLFE DU MEXIQUE, Côte du Yucatan, Banc d'Alacran.

.....	Banc de l'Obispo et Triangle du s.e.
.....	Cap Catoche.
.....	Cayes Arcas.
.....	Caye d'Arenas.
.....	Lagune de Terminos.
.....	Plan de Sisal, &c.

MER DES ANTILLES, et Golfe du Mexique, Navigation.

.....	Courants Généraux.
.....	Vents Généraux.
.....	Antigua (Ile).

..... Baie Willoughby.

..... Bahama (Iles de), Banc de la Cay de Sel, Cayes du Boule Ramé.

..... Grande Exnma.

..... Ports de la.

..... Mouillage de l'Ile de Crooked.

..... Bahama (Grand Banc de), Canal de Fleeming ou des Six Shillings.

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MEB DES ANTILLES, Bahama, Grand Canal de Highborne.	
..... Canal de Nurse.	
..... Canal du Navire.	
..... Canal de Wide-Opening.	
..... Le Grand Stirrup.	
..... Mouillages des Iles Ragged.	
..... Nouvelle-Providence.	
..... Baies de l'Ouest.	
..... et du Sud-Ouest.	
..... Port de Nassau.	
..... Passe de la Caye de Wax.	
..... Passe de Racoon.	
..... Port de Clarence, Ile Longue.	
..... Port de l'Ile Ragged.	
..... Rade de Douglas.	
..... Royale Ile.	
..... Bahama (Petit Banc de), Monillage Man of War.	
..... Mouillage de la Tortue-Verte.	
..... Petit-Port et le Port du Pélican.	
..... la Barbuda.	
..... Chiriqui (Lagune de), Bouche du Dragon.	
..... Bouche du Toro.	
..... Canal de Crawl.	
..... Canal du Tigre.	
..... Port de Shepherd.	
..... Cuba, Port de Jagua.	
..... Port de Matanzas.	
..... Récifs des Colorados.	
..... Culebra (Iles), et de Vièques; Porto Mula (Ile de Vièques);	
Port Culebra (Ile de Culebra).	
..... Grand Caïman.	
..... Honduras (Côte de), Atterrages de la Baie de Truxillo;	
Port Royal, Trou de Coxan (Ile Roatan).	
..... Omoa, Baie de l'Hôpital.	
..... Honduras—Anglais (Côte du), Baies de l'Ascension et	
d'Espiritu.	
..... Port de Belize.	
..... Honduras (Golfe de), Banc et Mouillages de Chinchorro.	
..... Ile Bonacca.	
..... Mouillage de Dunbar.	
..... Jamaïque, Ile de.	
..... Baie d'Anota.	
..... Baie Montego.	
..... Baie de Morant.	
..... Baie de Old-Harbour.	
..... Baie de Ste.-Anne.	
..... Cayes Morant.	
..... Port d'Antonio.	
..... Port Blewfields.	
..... Port de Falmouth ou de Marta Brac.	
..... Port de Kingston.	
..... Port de Lucea.	

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MER DES ANTILLES, Jamaïque, Port Morant.	
..... Port Mosquito.	
..... Port de l'Île Verte.	
..... Savanna de la Mar.	
..... Margarita (Île de), Baie de San Juan-Griego.	
..... et Golfe de Cariaco.	
..... Mosquitos (Côte des), Banc de Serrana, Canal de la Caye du Sud Banc du Roncador.	
..... Banc Serranilla.	
..... Cayes Courtown, et Cayes d'Albuquerque.	
..... Cayes des Perles.	
..... Entrées de la Lagune des Perles.	
..... Île de Saint André.	
..... Anse du Sud Ouest.	
..... Lagune de Blewfield.	
..... Petite Île de Corn, Grande Île de Corn.	
..... Port de Gracias á Dios.	
..... Port de Greytown.	
..... Navaza (Canal du Vent).	
..... Porto Rico, Baie de Mayaguéz.	
..... Sainte-Croix (Île de, Mouillage de Christiansted, Mouillage de Fredericksted.	
..... St. Domingue, Baie de la Caldera.	
..... Golfe de Port au Prince.	
..... Jaquemel.	
..... Môle de St. Nicolas.	
..... Tortola (Île), Baie de Road.	
..... Trinité (Île de la), Port d'Espagne.	
..... Vieille Providence.	
..... Baie de Sta. Catalina.	
..... Vierges (Île), Île Anegada.	
..... Canal de François-Drake.	
..... Vièques (Île de).	
..... Virgin-Gorda (Île de).	
..... Gorda-Sound.	
..... Yucatan (Côte du), Banc d'Alacran, Port d'Alacran.	
..... Île Cozumel.	
..... Port de Mugeres.	
..... Îles Saint-Jean et Saint-Thomas-Choquis de la Baie de Coral; Île Saint Jean Choquis de la Baie Lyuster; Île Saint Jean Choquis de la Baie de Krnyts, St. Jean.	
Reconnaissance Hydrographique de la Côte Occ. du Centre Amérique, comprise entre la Pte. Platanal et la Pte. Mariato.	
St. Thomas. Dansk Americansk—optaget 1—1835-39 ved Barometer og Vinkel, Maaling af H. B. Hornbeck, M.D.	

DÉPÔT DE LA MARINE.

**SOUTH AMERICA.**

Admiralty Chart. East Coast, Santa Catherina to Rio de la Plata.	
..... West Coast, Sheet I., from the Strait of Magellan to the Gulf of Trinidad. Sheet II., from the Gulf of Trinidad to the Gulf of Peñas.	
The HYDROGRAPHIC OFFICE.	

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 ..... Bahia de Todos os Santos.  
 ..... Flamingo Bay or Shark Roads.  
 ..... Maranham Road and Port.  
 ..... Parahyba do Norte River.  
 ..... Pernambuco Harbour.  
 ..... Port Maceio.  
 ..... Rio de Janeiro Harbour.  
 ..... San Sebastião, Anchorage off the Island of.  
 ..... Views on the Coast. The HYDROGRAPHIC OFFICE.
- CHILE.**—Admiralty Chart. Bay of Coquimbo and Port Herradura.  
 ..... Port of Huasco. The HYDROGRAPHIC OFFICE.
- GUIANA.**—British.—Admiralty Chart. Demerara, Mouth of the River.  
 ..... The HYDROGRAPHIC OFFICE.  
 .....—Dutch.—A Dutch Map of the River Surinam. J. H. Moseberg. 1801.  
 ..... JAMES MACQUEEN, ESQ., F.R.G.S.  
 .....—French.—Admiralty Chart. Entrance of the River of Cayenne.  
 ..... The HYDROGRAPHIC OFFICE.
- LA PLATA.**—Admiralty Chart. Buenos Ayres Roads and adjacent Coast from  
 Quilneo to Punta Olivos.  
 ..... Buenos Ayres.  
 ..... Maldonado Bay, entrance of River Plate.  
 ..... Rio de la Plata.  
 ..... The HYDROGRAPHIC OFFICE.
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 ..... Porto Bello.  
 ..... The HYDROGRAPHIC OFFICE.  
 ..... Nouvelle Grenade, Bahia-Honda.  
 ..... Baie de David ou Chiriqui.  
 ..... Baie de Pueblo Nuevo.  
 ..... Port de Carthagène.  
 ..... Port de Sabanilla.  
 ..... DÉPÔT DE LA MARINE.
- PARAGUAY.**—Track Survey of the River Paragnay. By Commander Thos. J.  
 Page, U. S. N. Sheets Nos. 10 to 15. New York, 1855.  
 ..... Mouth of the Parana and Uruguay. Sheet No. 1. Martin Garcia  
 and Martin Chico Channels (Colonia to Higeritas). By Commander T. J.  
 Page, U. S. N. New York, 1855.  
 ..... Track Survey of the River Parana. Sheet No. 2 (Buenos Ayres to  
 Paloma Island). By Commander T. J. Page, U. S. N. New York, 1855.  
 ..... Track Survey of the Rivers Salado, Parana, and Colastiné. By  
 • Commander T. J. Page, U. S. N. New York, 1855. The AUTHOR.
- PATAGONIA.**—Admiralty Chart. Gulf of St. George, Port of Melo.  
 ..... Inlet of Comau or Leteu.  
 ..... Piti Palena.  
 ..... Reloncavi.  
 ..... Leones, or Ship Isle and Harbour.  
 ..... Port of St. Domingo.  
 ..... St. Elena.  
 ..... Straits of Magalhaen, Ports in the, Nos. 1, 2, 3,  
 5, and 8. ●  
 ..... Tietoc Bay. The HYDROGRAPHIC OFFICE.

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PERU.—Admiralty Chart. Peru and Bolivia, La Laguna de Titicaca and the valleys of Yucay, Callao, and Desaguadero.

..... Coast of Peru, from Point Pasamayo to Point Negra, including the Road of Callao.

..... Road of Arica. The HYDROGRAPHIC OFFICE.

VENEZUELA.—Admiralty Chart. Bay of Carupano and Esmeralda.

..... Bay of Corsarios.

..... Port Cabello, Barcelona, and La Guayra.

..... Port of Mochima.

..... Unare Bay and Porto Santo.

The HYDROGRAPHIC OFFICE.

..... Vénézuéla, Curazao et Buen Ayre, et Baie de Santa Anna (Ile de Curazao).

..... Golfe de Paria.

..... Mouillage de la Guayra.

..... Port de Barcelona.

..... Puerto-Cabello.

DÉPÔT DE LA MARINE.

AUSTRALASIA.

AUSTRALIA.—Admiralty Chart. East Coast. Sheet 2.

..... Broad Sound, Shoal-Water Bay, Northumberland Isles, and Endeavour River.

..... Clarence Straits and Cape Byron Bay.

..... Views. Plate 18.

..... East and North Coasts. Views. Plate 18.

..... North Coast, Sheet 2. Gulf of Carpentaria.

..... North-west side of the Gulf of Carpentaria.

..... St. Asaph Bay, Port Cockburn, and part of Apsley Strait.

..... North-west Coast, Admiralty Gulf, and Vansittart Bay.

..... Buccaneer Archipelago.

..... Cambridge Gulf.

..... Camden Bay to Vansittart Bay.

..... Dampier Archipelago.

..... Exmouth Gulf.

..... South Coast. Sheets 1, 2, and 4.

..... Lady Bay.

..... Port Fairy.

..... Portland Bay.

..... Port Phillip, corrected to 1856.

..... Views. Plate 17.

The HYDROGRAPHIC OFFICE.

..... Sketch of the Northern Portion of South Australia, showing the country visited by recent explorers.

The COLONIAL OFFICE.

NEW ZEALAND.—Admiralty Chart. New Zealand. Sheets 2, 8, 9, 10, and 11.

..... North Island. Sheet 1. Hokianga on the west to Tutukaka on the east Coast.

..... Sheet 3. Mayor Island to Poverty Bay.

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<b>NEW ZEALAND.</b> —Admiralty Chart, North Island. Sheet 4. Poverty Bay to Castle Point, and continuation to Cape Palliser.	
..... Napier.	Ahuriri Harbour and Port
.....	Auckland Harbour.
.....	Bay of Islands.
.....	Coromandel Harbour.
..... and Anchorages.	Great Barrier Island, Ports
.....	Hokianga River.
.....	Kawhia Harbour.
.....	Manukau Harbour.
.....	Maurhanga Harbour.
.....	Mercury Bay.
..... bour.	Rangaounou, or Awanui Har-
.....	Tauranga Harbour.
..... godo River.	Tutukaka Harbour and Non-
.....	Waitemata River.
.....	Whaingaroa Harbour.
..... Middle Island.	Awarua, or Harbour of the
..... Bluff.	
.....	Cook Strait, Port Gore.
..... Bay.	Current Basin and French
.....	D'Urville Island, Cook Strait,
..... Port Hardy.	
.....	Ports Pegasus and Adven-
..... ture, Lord River.	
.....	Torrent Bay and Astrolabe
..... Road.	
.....	South Isle.
.....	Paterson Inlet and Port William,
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**ARCTIC.**

Admiralty Chart. North Polar Sea.	The HYDROGRAPHIC OFFICE.
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**ATLANTIC.**

Admiralty Chart. Banks of Soundings to the westward of the British Isles.	
..... Falkland Islands, Ports Fitzroy and Pleasant.	
..... Island of Fernando Noronha.	
..... Track of Vessels in search of the Eight Stones.	
	The HYDROGRAPHIC OFFICE.
Carte des Courants Généraux dans l'Océan Atlantique.	
..... Routes dans l'Océan Atlantique.	
..... Vents Généraux dans l'Océan Atlantique.	

DÉPÔT DE LA MARINE.

**PACIFIC.**

Admiralty Chart. Pacific Ocean. 12 Sheets; 11 published, 1 a blank.
.....● Actæon Group.



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- Admiralty Chart. Duke-York Island, Port Hunter.  
 ..... Gambier Group.  
 ..... Guahan or Guam Islands, Puerto de Apra and Tinian Bay.  
 ..... Umatac Bay.  
 ..... Heyow Lagoon.  
 ..... Lord Auckland Group and Campbell Island.  
 ..... New Britain, English Cove, and Gower's Harbour.  
 ..... St. George's Sound, Carteret Harbour.  
 ..... New Caledonia, Port St. Vincent on the west side.  
 ..... Peeloo Archipelago.  
 ..... Pitcairn Island.  
 ..... Port Praslin.  
 ..... St. Cruz Island, Byron Bay, and Swallow or Water Bay.  
 ..... Socorro Island, &c.

THE HYDROGRAPHIC OFFICE.

Carte des Courants Généraux dans l'Océan Pacifique.

- ... Général des Routes dans l'Océan Pacifique.  
 ... des Vents Généraux dans l'Océan Pacifique.  
 ... de l'Archipel des Pomotous.

DÉPÔT DE LA MARINE.

MISCELLANEOUS.

BEAUFORT, Sir F.—Portrait of Adm. Sir F. Beaufort, K.C.B., F.R.G.S., late Hydrographer to the Navy. From the original portrait presented to Greenwich Hospital by the subscribers to the Beaufort Testimonial.

Capt. J. WASHINGTON, R.N., F.R.G.S.

BOURNE's New System of Indian River Navigation, by means of Steam-vessels of shallow draught. Two lithographs.

J. BOURNE, Esq., C.E.

LIVINGSTONE, Dr., F.R.G.S., Lithographic Portrait, in frame.

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Thermometrical Boiling Water Apparatus, for Heights.  
Two Newman's Improved Iron Cistern Mountain Barometers.

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CAPT. R. F. BURTON, East Africa Expedition—

Four Thermometrical Boiling Water Apparatus for Heights. By Casella.

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PRESENTATION  
OF THE  
ROYAL AWARDS

TO

PROFESSOR ALEXANDER DALLAS BACHE, OF THE UNITED STATES; AND CAPTAIN COLLINSON, R.N., THE ARCTIC EXPLORER.

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THE President read the following statements explanatory of the grounds on which the Council had awarded the Royal Medals respectively:—

The Victoria or Patron's Medal has been adjudicated to Professor Alexander Dallas Bache for his successful labours in carrying out the Great Coast Survey of the United States of America. This noble work owes its origin, we believe, to the suggestion of those enlightened statesmen Jefferson and Gallatin, as early as 1807, and was supported in 1809 by the American Philosophical Society, when Mr. Hassler, an eminent geometer of Switzerland, then resident in the United States, was entrusted with its execution. But war, and the time required for the manufacture of the instruments, delayed the commencement of the work till 1816. Continuing the Survey, with a brief interruption, to 1844, Mr. Hassler was then succeeded by our Medallist.

Operations of this nature will, of course, have been made available for a correct delineation of all the surface of the interior; for it is manifest that every triangle referable to a known unit furnishes three decided bases with which others may be connected in any direction, as long as there remains a *terra firma* for the instruments to stand on; but these internal operations being more of a domestic nature, do not appear to the Council to establish any distinct claim to the Medal. The case, however, is very different when we come to consider the accurate delineation of such a coast as that of the United States, commencing at the State of Maine, comprising no less than eighteen states on the Atlantic and Gulf of Mexico,

besides others on the Pacific, and extending, as we are credibly informed, over not less than 30,000 miles. This number, no doubt, includes all the windings and indentations of the coast, and the interiors of its harbours, the islands, &c.; for it is to be remarked that, by the especial provision of the Government of America, the duty is not confined to one class of persons, but is shared equally by military and naval men and civilians, all chosen for their fitness, whereby not only is the field for selection vastly expanded, but a greater facility of correctly taking soundings and delineating shoals, harbours, and isolated rocks, is afforded.

It would be impossible to do justice to an extensive work of this sort on an occasion like the present; but as the previous Reports of this celebrated Coast Survey from 1844 to 1855, inclusive, are in our Library, those of our Associates, and of the public generally, who wish to form an estimate of their value, can do so at their leisure, and they will see how vastly our Medallist has pushed on this great work. They will assuredly then rise from the examination with the thorough conviction that, whether we regard the science, skill, and zeal of the operators, the perfection of their instruments, the able manner in which the superintendent has enlisted all modern improvements into his service, the care taken to have the observations accurately registered, his modest and unpretending demeanour, or the noble liberality of the Government, tempered with prudent economy, all unprejudiced persons must agree that the Trigonometrical Survey of the United States of America stands without a superior.

What then are we to say respecting the accurate delineation of this immense tract of coast, so much frequented by commerce, so important in every point of view to mankind at large, but that it is a great and universal boon conferred on all the inhabitants of this globe? We all benefit by the security of navigation; it is not the Government of the United States of America alone which derives an exclusive advantage from this admirable series of operations, but those who have most frequent access to the shores of the Atlantic and Pacific chiefly participate therein; and as Great Britain stands foremost amongst these, on whom can we so deservedly bestow one of our two Royal Gold Medals this year?

The President then addressed his Excellency the American Minister in these words:—

“ Mr. Dallas.—Whilst I can truly say that the Council and myself rejoice in this opportunity of recording our sense of the high merits

of Professor Bache, I have a peculiar satisfaction in being permitted to place the Victoria Medal of the Royal Geographical Society in the hands of your Excellency, with the request that you will convey it to your eminent relative.

“The grounds for making the award of the highest distinction which it is in our power to confer, have been expressed in the terms sanctioned by the Council; but that document does not allude to other great qualities of a man who, besides his admirable Coast Survey, has so largely extended our knowledge on various subjects of scientific importance. I may here cite his delineation of the iso-magnetic curves both in Europe and America, his littoral and deep-sea soundings, which, it is believed, will soon enable us to read off the natural history of the Gulf Stream, and to calculate the periodicity and perturbations of the tides at given spots, and his many ingenious inventions, including a method of registering the pulsations of distant earthquakes.

“British philosophers, Sir, have indeed long admired the progress of your accomplished relative, as I can personally testify; for when he visited our country, in 1847, I had the gratification, on resigning the chair of the British Association to my esteemed friend Sir Robert Inglis, to welcome Mr. Bache to our meeting at Oxford, where he presented to us some results of his great Survey, and we did honour to ourselves by enrolling him among our honorary members.

“Lastly, Sir, when I know how successfully he has recently been labouring to aid the accomplishment of the submarine electric telegraph which is to unite our countries—that this same individual is the great-grandson of the illustrious Benjamin Franklin, as well as the near relative of one of your leading statesmen, and that, bearing his honoured name, he is your own nephew, I feel, in common with my Associates, that there never was an occasion on which the sympathies and just pride of our kindred nations were more thoroughly united, than they are by the adjudication of the Victoria Gold Medal to Alexander Dallas Bache.”

The American Minister thus replied:—

“Mr. President,—I receive with much gratification, on behalf of my eminent fellow-citizen, Professor Alexander D. Bache, this mark of the approbation of your learned Society.

“The fame of her sons in the noble brotherhood of science is a most cherished part of my country's wealth and strength; and, as her national representative, I thank you, Gentlemen, for thus adding to her store.

“Professor Bache has for many years discharged elevated, interesting, and arduous duties under the Government of the United States. He was specially fitted for these by academical training and successes, by educational labours, by an intellect at once lucid, profound, and persevering, and by an aptitude, not too common with reserved students and philosophers, for practical method and administration. Without adverting to a rich series of prior and of



accessory performances, I speak with entire certainty in saying that his chief work (though yet uncompleted), the Survey of the American Coasts, Sounds, and Estuaries, in all their expansion, intricacies, and characteristics, admirably delineated, as if daguerreotyped, in charts of extraordinary perfection, has earned for him a solid and enduring reputation in this, as in our own, hemisphere.

"I believe him, Sir, in every respect entitled to the high honour you confer by awarding this Medal, and am happy in being made by your distinguished Association the medium of its safe transmission."

The Founder's or King William Medal has been decerned to Captain Richard Collinson, R.N., C.B., &c., &c., for having in Her Majesty's ship *Enterprise*, though baffled by provoking calms and adverse winds, ultimately passed through Behring Straits in search of Sir John Franklin and his companions. Hampered by those glacial obstructions which every change of wind wafted against him, and greatly perplexed by the proofs occasionally found of his former companion, McClure, being in advance, but without the slightest intimation of the course he had pursued, Captain Collinson deemed it advisable to follow the open water in shore, and thus penetrated farther to the eastward than any vessel had ever reached, approaching nearly to the point attained by the *Hekla* from the Atlantic in 1819.

Though employed on a mission of pure humanity, Captain Collinson was quite alive to the benefit commerce might derive from taking advantage of the now discovered resort of shoals of huge whales, seen from time to time disporting themselves in unvisited security; and, therefore, this voyage has also the merit of extending the field of that profitable fishery in the Arctic Seas.

Captain Collinson's previous services as a surveyor (and he was with our late lamented President Admiral Beechey) in different latitudes, but more particularly on the coast of China—at Canton, Golongsoo, and especially when he surveyed the channel before Woosung, and surmounted all the difficulties in the navigation of the Yang-tse-kiang, during the advance of the British on the city of Chin-kiang-foo, are to be found in the Gazette of 1841 and 1842. His accurate description of his track left nothing to be desired.

Captain Collinson's astronomical observations, together with his contributions to the geography of Arctic America, have already appeared in the Society's Journal, vol. xxv., and are highly appreciated for having corroborated and given a more fixed character to our knowledge of those regions.

While carried forward by his great zeal and courage, and far

beyond any of his predecessors—no ship having been there before—it must also be remembered that this officer exhibited peculiar skill and prudence in the selection of his route, in overcoming great impediments and the opposing current, and, lastly, in re-conducting his ship from that dreary solitude and monotonous waste of waters in safety to his own country.

A detailed list of his geographical positions has been printed in the Journal, and a synopsis of his meteorological, tidal, and other scientific observations has been deposited with the Society.

The President then addressed the recipient of the Founder's Medal in these terms:—

“ Captain Collinson,—As a friend of Franklin of thirty-five years' standing, and as one who has had his heart set upon never ceasing to search the Arctic regions until we obtained true tidings of the fate of that great explorer and his gallant companions, I enjoyed the sincerest gratification when our Founder's Medal was unanimously voted to you at a full Council where you only (at my own request) were absent.

“ Gratified as I have invariably been in seeing all our Arctic explorers rewarded, it truly gladdens me to have your name added to the list of those noble British seamen who have received our highest distinction for their meritorious services, whether in the cause of Arctic geographical discovery or in the subsequent searches after Franklin.

“ When we know how perseveringly you endeavoured to realise a north-eastern passage from Behring Straits, by carrying your sailing ship, the *Enterprise*, to a more northern latitude in that meridian than any British seaman had attained, and that, treading a large part of the north coast of America, you pushed your vessel up the eastern side of Banks Land to nearly the same point as your eminent brother medallist M'Clure, and that when foiled by the great packs of ice you retraced your steps, and, nothing disheartened, still threaded your way eastward along the mainland until you reached the open sea between Victoria Land and King William Island, whence you brought back your ship to England, I have strong grounds for saying, that we mete out but simple justice in granting to you this distinction.

• “ There is yet, Sir, another reason which operates strongly in satisfying me that you are well worthy of this or any honour which may be conferred on you. You warmly advocated the last search after Franklin; and if your judicious suggestion had been complied with, of sending once more a vessel by Behring Straits to the spot whither you went and whence you returned, and on the successful repetition of which you staked your well-earned reputation, we should now feel no anxiety respecting the isolated efforts of M'Clinck; whilst, to the eternal credit of our country, the problem of the fate of Franklin would in all probability have been for ever solved.

“For all these reasons, and also because, though not chosen to perform any part of the noble mission on which your mind was bent, you have earnestly laboured in carrying out the last Franklin Fund Subscription in aid of the survey undertaken by your younger brother officer McClintock, I have the sincerest pleasure in putting this Medal into your hand.”

Captain Collinson then replied:—

“Mr. President,—I must ever retain a lively recollection of the kind and impressive manner with which you have conveyed this honour—an honour which is greatly enhanced in my estimation by its having come through the hands of one who not only holds so eminent a position in the scientific world, but who has taken so deep and unswerving an interest in that great cause which has led to its bestowal. I receive it, Sir, as the tribute which Knowledge pays to Enterprise. Hand in hand the two sisters have worked together, the one, by laborious study and close reasoning, pointing out the path which the other, firmly relying on the matured judgment of her elder sister, has unhesitatingly followed, until, in this our day, we have seen the Himalayas mapped, a great portion of the interior of Australia explored, an Antarctic continent discovered, the water boundary to America established, and last, but not least, Africa permeated.

“These results have to a great extent exhausted the field of exploration, but a higher and a nobler task awaits their efforts; we have to turn them to good account; and whether we go forth as settlers to occupy, or as merchants to exchange our manufactures for the natural productions of these distant regions, we have to diffuse among their inhabitants the comforts of civilization, the advantages of free institutions, with the blessing of that true and holy religion under the special providence of which we have spread from an insular kingdom to a mighty empire.

“Though these things are rapidly coming to pass, we cannot expect to see them fully realised; after ages will, however, acknowledge with gratitude the furtherance which they have received from the influence of this Society—a Society through whose annals the public is made acquainted with the progress of discovery, where the field of ambition is opened to the young geographer, who is shown the best means of accomplishing his object, and where (but with diffidence I now say it) a generous stimulus is given to scientific research and to perseverance under difficulty, by the distribution of honourable distinctions, such as it is my good fortune to have been deemed worthy of deserving.

“I have to thank you, Gentlemen, for the kind reception you have given to the award of the President and Council. Your cordiality has afforded me a life-long gratification: it sends me to my seat with the assurance that on this occasion I may assume the motto of that illustrious seaman who made the signal ‘England expects every man to do his duty’—‘*Palmam qui meruit ferat.*’”

# A D D R E S S

TO THE

## ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

*Delivered at the Anniversary Meeting on the 24rd May, 1858,*

BY SIR RODERICK IMPEY MURCHISON,

G.C.Sr.S., D.C.L., M.A., F.R.S., &c.,

PRESIDENT.

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GENTLEMEN,—At the last Anniversary it was my mournful task to advert to the great losses we had sustained by the decease of my two predecessors as well as of several other geographers of distinction. Although on this occasion the hand of death has not fallen so heavily upon our leaders, we have still to lament that some of our most distinguished associates have been taken from us. At the head of this list I unquestionably place the name of one who, after a long and well-spent life, has passed away in the ripeness of age, having won for himself the admiration of all those who knew him during the last half century. That man was Rear-Admiral Sir Francis BEAUFORT, who, whether we look to the bravery, zeal, and talent he displayed in his earlier days as a naval officer afloat (one whom every sailor would have followed to the death), or to his maturer years when he shone as the bright scientific light of the British Admiralty, has his memory embalmed in our love and respect.

I will not now attempt to lay before you details respecting a seaman whose naval career and professional merits have already been ably and succinctly delineated by his old associate in arms, Admiral Smyth, in the Journal of the Royal Astronomical Society. Due honour to his name and deeds will doubtless further be paid in the ensuing anniversary discourse of the President of the Royal Society, of which parent body he was also a distinguished

member. In the mean time many salient and characteristic anecdotes of him having been chronicled in periodicals,\* my present aim will be confined to a brief sketch of his career and the record of those incidents which directly connect him with the Geographical Society.

Born in the year 1774, young Beaufort owed his first instruction in geography to his father, the vicar of Collon and rector of Navan in Ireland, who made one of the earliest good maps of that country. Entering as a cadet in the East Indianman *Vansittart*, he assisted in surveying the Strait of Banca, and narrowly escaped death after shipwreck. Serving successively in different ships of the Royal navy, he took part in Lord Howe's memorable victory of the 1st of June, 1794, and acting under Admiral Cornwallis was present in his celebrated retreat of the 17th of June, 1795, and assisted in the capture of many privateers and other ships of the enemy. On the coast off Malaga, he afterwards captured the Spanish polacca *San Josef* when protected by batteries and a privateer by boarding her from boats; not, however, without receiving many wounds, for which splendid service the young Lieutenant was rewarded with the rank of Commander. From that period (1800) until he obtained the step of Captain in 1810 he was busily employed in convoying fleets to India, partaking in the expedition to the Rio de la Plata in 1807, or hovering round the enemy's ports in Europe. In command of the fine frigate *Frederiksteen*, he surveyed the south coast of Asia Minor from 1810 onwards, and afterwards gave to the public that remarkable work '*Karamania*,' which holds so high a place among our standard writings on geographical and antiquarian science. While on the survey of that coast he was badly wounded by a Turk, but was still enabled to complete his work so as to supply excellent charts for the Admiralty of the coast of Karamania. After some interval our deceased member was appointed in 1825 to the post of Hydrographer, which he filled with unrivalled success until two years before his decease, when his advanced age and infirmities compelled him to resign, to be succeeded by his distinguished *deceased* Captain Washington.

In reviewing the useful and practical life of Beaufort, it can truly be said that during 26 years he so directed the Hydrographical Office that it became the model which all other governments sought to follow. It was indeed gratifying to men of science to see the

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\* See particularly a lively and characteristic sketch of Sir Francis Beaufort, 'Daily News,' January 15, 1858.

friend and companion of Wollaston, of Young, and of Davy placed at the head of the Scientific branch of the Navy—not as a mere servant of a Board, but as a man with mind and energy to think and act for himself. Nor was it long before proofs of his influence and activity became visible. Seconded by an able staff of surveyors, proud to serve under one so competent to appreciate their labours, he soon gave them occupation. FitzRoy, worthy pupil of such a master, was despatched to complete the survey of South America; Belcher, Kellett, and Wood were sent to examine the south coast of Central America and of Mexico; Vidal, Denham, Skyring, and Arlett were charged to complete the west coast of Africa; Blackwood and Owen Stanley, names dear to every lover of science, undertook the survey of the north-east coast of Australia and of New Guinea. Sullivan went to the Falkland Isles and the river Plate, Stokes and Drury to New Zealand, Bate to Palawan, Belcher, Kellett, and Collinson to China, Owen and Barnett to the West Indies, Bayfield and Shortland to the St. Lawrence and Nova Scotia, Graves and Spratt (the pupils of Mediterranean Smyth) to the Greek Archipelago, Hewett to the North Sea, Beechey to the Irish Sea, while many others spread their labours over different portions of the coasts of the United Kingdom. Forbearing on this occasion to expatiate on the merits of the many distinguished and zealous surveyors who carried out these researches in various quarters of the globe—men whose names have been often mentioned in our volumes, and some of whom have obtained our highest honours—I have no hesitation in affirming that the master mind of Beaufort, which directed such noble efforts during a quarter of a century, did more for the advancement of maritime geography than was effected in the same time by all the surveyors of other European countries united. Nor was it seamen only—but all men of science, as well as every traveller and geographical explorer of unknown lands, whether native or foreign, who always obtained from him the clearest information, which was communicated in the heartiest manner. Indefatigable in the transaction of business, and not trusting to others what he could do with his own compass and pen, there was no public servant who more uprightly served his Sovereign and his country.

By his official labours he brought up maritime surveying to the state of improvement it now exhibits. Beginning with our own shores at a period when all knowledge respecting them was fearfully inaccurate, he originated that series of works which, as I have

already mentioned, he extended to nearly all the coasts of the world. Nay, he also issued so long ago as 1831 those instructions for deep sea soundings which Lieutenant Maury and others have since matured. Such great plans were, indeed, but commensurate with Britain's naval supremacy, and were really called for. Although much was done, still much more might and would have been done had Beaufort had his way; but parsimony (such, indeed, as seems to be periodically and, as it were, spasmodically exerted by economists in depressing our naval and military establishments) threw back, for a quarter of a century, those results which our lamented member would speedily have obtained, to the great advantage of the nation and the saving of innumerable lives from shipwreck!

Whilst presiding over geographers, let me further remind you of the obligations of the nation to Francis Beaufort independently of his intensely hard official work. For, he was the individual of that Society which, under the guidance of Lord Brougham, gave such an impetus to the Diffusion of Useful Knowledge, and who laboured perseveringly and successfully for many years in editing and bringing out the collection of maps issued by that meritorious body. From the allusion to a Society in which I played a much more humble part, I hope to be excused if I say a few words respecting my own connexion with the late Hydrographer, as they may serve to shadow forth to those who knew him not, other traits of his noble character.

First making his acquaintance at the house of the illustrious Wollaston, I could not fail to observe in both these great men the same truthful singleness of purpose and the same inflexible resolution to carry out their well-matured designs for the advancement of science. Always admiring and cultivating the friendship of Francis Beaufort, it has been my pleasing duty, whether as your President or one of your Council, to have had much intercourse with him, and also to have had the honour of being associated with him in drawing up some instructions for the exploration of distant realms. On no one, however, of those occasions have I seen the kindest feelings of his breast so much roused, as during the recent efforts of this Society to animate the country and the Government to make a last search for Franklin and his missing ships. In all the great tentative efforts which Britain made during a series of years to discover the traces of that lamented navigator, Francis Beaufort was indeed ever (as he is represented in a well-known engraving)

the centre of that group of distinguished explorers and friends of the missing navigators—the animus from which proceeded the devices and arrangements of the Arctic expeditions.

As he never abandoned hope, so long as his mind's eye could discern in the distant perspective a single plank of the *Erebus* and *Terror*, nor shrunk from endeavours, so long as there was the remotest chance of saving the life of one of the fine young officers and men of Franklin's ships, I recur with delight to the scene when, in his 83rd year and reclined upon his couch, his face beamed with joyous hope when he put his hand to that memorial which I had the honour to present to Her Majesty's Government, praying for a last and limited search after the relics of the missing expedition. Nor, when that appeal, which sought to send a Collinson once more to the area which he had so nearly approached, and from which he so skilfully brought back his ship, had unfortunately failed, can we forget with what renewed fervour the retired and venerable Hydrographer united with us in promoting and sustaining the efforts of the magnanimous woman who alone undertook the task of sending out the expedition under M'Clintock, to the issue of which we all now look with such deep anxiety.

In short, it was a genuine and innate kindness of soul, united with the highest moral worth and the brightest intellect, as displayed throughout his long life, that attached every friend to him with an abiding regard, and obtained for Francis Beaufort a reputation which will endure as long as the English nation shall honour one of her truest worthies.

Sir Francis Beaufort attained the rank of Rear-Admiral in the year 1846, and in 1848 was decorated with a Commandership of the Bath. He had also the honour to be a Corresponding Member of the Institute of France, a D.C.L. of Oxford, and an honorary member of various foreign Societies. He had long been a distinguished Fellow of the Royal Society; was one of the founders of this Society, and I need scarcely remind you that he was ever the most zealous and enlightened supporter of our onward progress.

In the Obituary of last year I spoke to you of the merits of one of the brightest lights of British geological science in the late Dean Buckland, and now it is my sad duty to advert to the other kindred spirit of the University of Oxford, the Rev. William CONYBEARE, Dean of Llandaff, who, when I entered upon the pursuits of geology, was one of my respected leaders, and to whom I became sincerely attached. The son of the rector of Bishopsgate, and the grandson



of a dean of Christchurch, William Conybeare was born in 1787, and educated first at Westminster; his earlier acquirements being matured at Oxford, where he was distinguished as a scholar. He no sooner quitted the University of Oxford, in which he had taken high honours at the same time as the late Sir Robert Peel and the present Archbishop of Dublin, than he spent the leisure hours of a country clergyman in recording the natural phenomena of the subsoil and its products. Becoming a member of the Geological Society, he gave to that body his first Memoir in 1814, and eventually prepared, in conjunction with Mr. W. Phillips, '*The Geology of England and Wales*' (1822). By that excellent work, of which his associate undertook the mineralogical portion only, Mr. Conybeare fairly established himself as one of those who, following in the track opened out by William Smith, of identifying strata by their fossils, were the founders of that British geology which has sent its types and nomenclature through the world.

Any one who may refer to this volume will see how invariably the author adopts the true method of geological arrangement, by beginning the description of each natural deposit in the crust of the globe by a clear delineation of its geographical outlines and the character of the country. Even in his '*Introduction*' we find comprehensive views of the structure of the earth enunciated with the enthusiasm of a real lover of geographical discovery, when he thus incites the geologist to push on fearlessly in the search after truth—"how little comparative curiosity should we feel concerning the course of the Niger or the North Coast of America could they be as easily examined as the Thames and the Channel!" In every chapter of the same work we meet with sketches of the surface and external characters of each tract, as well as the heights of the hills, and the phenomena of wells and springs (all of them integral geographical data), duly interwoven with an account of the chemical and mineral qualities of the subsoil, the imbedded fossils, and the erosion and fractures to which the strata had been subjected. Again, the long, coloured section, from the Land's End on the west to the German Ocean on the east, is in itself a fine sample of the generalising powers of Conybeare; for although geology has made vast strides since the year 1822, many of the features of this remarkable picture of the then state of our knowledge are still as true as when the author sketched them with the bold hand of a master.

In the same year Mr. Conybeare also displayed his talents as a

naturalist and comparative anatomist, by his notice of a then unknown fossil reptile, which he showed to be a link between the ichthyosaurus and the crocodile, and to which he assigned the name of plesiosaurus. This memoir, and another on the same subject in the succeeding year, created a most lively sensation among all naturalists, and winning the admiration of Cuvier, obtained for our deceased Associate the honourable post of correspondent of the Academy of Sciences. But I will not attempt to enlarge on these geological and palæontological triumphs, as my contemporary General Portlock has done ample justice to them in his recent Presidential Discourse, addressed to the Geological Society, in which he has successfully delineated the scientific merits of William Conybeare.

Retiring gradually from the toils of the geologist, and restricting himself to those clerical duties and theological readings which enabled him to obtain the dignity in the Church which he occupied for some years before his death, the last geological effort of Mr. Conybeare was his Report on the Progress of Geology, which, as a spectator more than an active workman, he gave to the British Association for the Advancement of Science, when they held their first meeting at Oxford in 1832.

The masterly manner in which he then grouped the various data, and recorded the advances made in the years which had elapsed since he was himself a contributor to the science, produced a deep feeling of gratitude on my part; for he encouraged me by the assurance that the distinction which had then been recently conferred upon me by placing me in the chair of the Geological Society had been worthily vindicated by my labours in the North of Scotland at one end of the European scale, and in the Alps at the other, as exhibited in a great section across Europe which he had prepared.

This approval of so eminent a man was indeed a main cause in leading me to make other exertions, which up to this day have not been discontinued; and whatever little merit they possess, I feel that they have been to a great degree elicited, first by the works and example, and then by the advice and approbation, of William Conybeare. For, even in succeeding years, when retired in his deanery at Llandaff, he again incited me, after my journeys in Russia, at once to publish a geological map of Europe; saying that the area which, in conjunction with my friends, I had laid down in that vast empire would enable any compiler to deprive myself

and associates of the honour which justly belonged to us, of producing the first Geological Map of Europe arranged on the principles of British classification.\*

Long as I have been connected with the pursuits of science, I never yet met with any one of its cultivators who had a more ingenuous love of truth than Dean Conybeare; and I can safely affirm that he was universally beloved in the Geological Society, in which he bore so conspicuous a part. In addition to his scientific acquirements, the Dean of Llandaff was one of the best Greek scholars of his day, and was as deeply read in classics as in that ancient literature of the Church, in the study of which he passed many of the latter days of his life—happy in seeing that the true learning, high principles, and right feeling which he had implanted in the minds and hearts of his sons (of whom, alas! he had lost two) were raising them in the walks of life they had respectively embraced, to positions in which they are doing all honour to the name of Conybeare.

Rear-Admiral Sir John Ross, K.T., C.B., who was born in 1777 at Balsaroch, Wigtonshire, entered the Royal Navy in 1786, served in the Mediterranean until 1789, and afterwards in the Channel. He was in the expedition to Holland, and also under Sir James Saumarez. In 1808 Lieut. Ross acted as Captain of the Swedish fleet, and was made a Commander in 1812. During his war services in three different actions he was wounded thirteen times.

In 1817 the Admiralty having resolved to attempt to solve the question of the North-West Passage, Commander Ross was appointed to the *Alexander*, and Lieut. W. E. Parry to the *Isabella*; they sailed in 1818, and having made the circuit of Baffin Bay, returned to England the same season, when Ross was promoted to the rank of Captain. In 1829, aided by the munificence of Mr. Felix Booth, he purchased the *Victory*, a steam-vessel of 150 tons, to follow up the discoveries already made in the direction of Barrow Strait.

The *Victory* sailed from England in 1829, Commander (now Sir) James Clark Ross being second in command. Having visited the

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\* As soon as the geological map of Russia was published (1845), embracing nearly two-thirds of Europe, and that my colleague de Verneuil had produced a map of Spain (the only then remaining *terra incognita geologica* of Europe), it was evident that a general map might then be constructed chiefly by compilation. I delayed so long in profiting by the sound advice of Dean Conybeare, that when my map of Europe appeared in 1854, it was soon followed by the large and brilliantly coloured map of Dumont of Liège. The cartographer will at once see, by comparing them, how vast a portion of the work of my eminent Belgian contemporary has been derived from the map of Russia.

wreck of the *Fury*, in Regent Inlet, the *Victory* reached Cape Garry in August, 1829, and thence proceeded South-West to lat.  $70^{\circ}$  North, and long.  $92^{\circ}$  West, when an impenetrable barrier of ice finally compelled her to winter in Felix Harbour. During 1830 Captain Ross could only move the *Victory* about four miles, and in the following year merely gained a port fourteen miles farther, now named Victoria Harbour, where, after another winter, he abandoned his vessel, in May 1832. Exposed to much danger, the party made their way northwards to about lat.  $74^{\circ}$  North, and long.  $90^{\circ}$  West, but want of provisions and the approach of winter obliged them to return to Fury Beach, which they reached on the 7th of October, about three years after the time they passed it on their outward voyage. Here they lived in a hut 32 feet long, made from the wreck of the *Fury*, and passed another dreary winter amidst privation and considerable suffering.

On July 8th, 1833, Captain Ross and his party made a last effort to escape. Dragging the sick to the boats, they embarked, and crossing the inlet to Cape York, reached a point East of Navy Board Inlet, where they fortunately got on board the whaler *Isabella*, formerly commanded by the gallant Captain himself, and in October they arrived in England, to the joy of us geographers, who, failing to induce the Admiralty to send out a searching vessel, had commenced a subscription for the purpose.

In the same year 1833 Capt. Ross deservedly obtained the Gold Medal of this Society "for discovery in the Arctic Regions of America," and the Gold Medal of the Geographical Society of Paris, together with various foreign orders, including that of the Swedish Polar Star; and in December, 1834, he received the honour of Knighthood together with that of C.B.; his patron, Mr. Felix Booth, being raised to a Baronetcy by King William IV., who entertained a personal regard for our deceased Associate. A committee of the House of Commons assisted by scientific men appointed to investigate the results of this expedition declared that they saw no reason to doubt that Captain Ross nearly approached, and that Commander James Ross had actually reached, the Magnetic Pole.

Sir John Ross was the author, among other works, of Letters to Young Sea Officers, Memoirs and Correspondence of Admiral Lord de Saumarez, and a Treatise on Navigation by Steam: he also translated and edited a Memoir of Admiral de Krusenstern, which was dedicated by permission to this Society.

This gallant officer and persevering explorer was promoted to

the rank of Rear-Admiral in July, 1851, and died in November, 1856.

By the death of the Rev. Sir Henry DUKINFIELD, Bart., I lose one of my oldest and most steadfast friends. He was the third son of Sir Nathaniel Dukinfield, Bart., of Stanlake, Berks.

Educated at Eton and Oxford, and there forming intimacies which lasted through life, Henry Dukinfield had been for many years a zealous and devoted provincial clergyman before he succeeded to the title by the death of his elder brother Sir Lloyd. After he had performed his duty in an exemplary manner for 18 years as Vicar of St. Giles's, Reading, that eminent scholar the late Dr. Blomfield, Bishop of London, selected Sir H. Dukinfield to assume the important duties of Vicar of St. Martin's in the Fields, most of the parishioners of which were, at that time, in avowed hostility to their pastor. And never were duties more earnestly, sedulously, and honourably performed. His influence throughout that populous parish became so felt from the peer to the humblest artisan, and he so laboured in calming rivalries and disputes in the vestry, that when from the state of his health he found himself compelled to retire from the active scene, he received the heartiest thanks from all his flock, as well as from numerous Dissenters; with the expression of their deep regret at being deprived of his aid and counsel.

Having long thought that habits of cleanliness were essential to the raising of the humbler classes in their moral condition and well being, he worked out and completed a favourite scheme at which he had been labouring for some years, of establishing cheap public baths and wash-houses; and though necessarily excluded by his profession from a seat in Parliament, the Act which sanctioned these highly useful adjuncts to the comfort of the people is, and will always be, known as *Sir Henry Dukinfield's Act*.

After retiring from St. Martin's, and during his latter years, far from being contented to live a life of idleness, he never failed (and, as I can testify, often when unwell) to assist his overworked brethren in the Church. He also took the liveliest interest in establishing the New Hospital for Sick Children, and so supported it for six years by personal superintendence, preaching sermons, and procuring subscriptions in addition to his own, that as chairman of the Committee he was justly considered the mainstay of that useful establishment.

With these legacies to his country, Sir Henry Dukinfield left behind him such a character for *probity*, kindness of heart, and un-

tiring zeal in the promotion of every philanthropic object, united with the manners of a high bred gentleman and the acquirements of a scholar, that he was justly regarded as a pattern of a Christian whose deeds were continual proofs of the sincerity of his faith. He married the widow of the distinguished Peninsular officer Lieutenant-General Chowne, who, as well as his only sister Mrs. Priehard Smith, survive to mourn his loss. As he left no male heir, the ancient baronetcy conferred by Charles II. on the son of the "gallant and honest" Colonel Dukinfield of Dukinfield, Cheshire, so distinguished in the Civil Wars, has become extinct.

Sir George DUCKETT, Bart., M.A., F.R.S., who was one of the early Members of this Society, having joined it at its commencement, in 1830, died on the 15th of June last, at the age of 78. He was the son of Sir George Jackson, Bart., formerly Secretary to the Admiralty and Judge Advocate, and many years M.P. for Colchester and Weymouth; the name of Duckett having been assumed after his maternal grandfather. He represented Lymington from 1807 to 1812, was a Deputy Lieutenant for Herts, and at one time was Colonel of the West Essex Militia.

Sir George was a zealous supporter of science, a profound classical scholar, and a good linguist; having translated various Scriptural works from the German. In private life he possessed many amiable and excellent qualities, and his death was deeply deplored by all those who knew his worth.

Charles William, Earl FITZWILLIAM, K.G., F.R.S., another of the early members of the Society, died on the 14th October last, at the age of 71. The only son of William, fourth Earl Fitzwilliam, he was educated at Trinity College, Cambridge, and as Lord Milton represented the county of York in the House of Commons in seven successive Parliaments between the years 1807 and 1833, and succeeded to the Earldom on his father's death that same year. Earl Fitzwilliam was essentially manly and honest as a public man, and among the many traits of benevolence by which his conduct was characterised, no one was more conspicuous than his early and unceasing endeavours to bring about an abrogation of the corn laws. Blessed with a deep sense of religion, and largely exercising the gifts of charity, the liberality of this public spirited and upright nobleman extended itself to science both in a pecuniary form and in rendering personal assistance.

Nor had any one a juster appreciation of the public value of scientific pursuits. As far back as 1831, when few senators had

given encouragement to science, and when I was one of the few men who assembled at York to support the scheme suggested by Sir D. Brewster, and worked into an efficient system by my enlightened friend William Vernon Harcourt, Lord Fitzwilliam, in describing the benefits to be expected from the institution of the British Association for the Advancement of Science, over the first meeting of which he presided, thus spoke: "I hope that the meetings thus auspiciously begun, will rapidly advance to still greater importance, and become the source of incalculable advantage to science hereafter. In addition to other more direct benefits, I hope they will be the means of impressing on the Government of this country the conviction, that the love of scientific pursuits and the means of pursuing them are not confined to the metropolis; and I hope that when the Government is fully impressed with the knowledge of the great desire entertained to promote science in every part of the empire, they will see the necessity of affording it due encouragement, and of giving every proper stimulus to its advancement."

The death of this good and patriotic nobleman was as deeply deplored by all those persons of the upper and middle classes who partook of his widely-spread hospitality, as by the masses of the people, of whom he was the ardent friend and protector.

The life of Lieut. J. Baptiste HOLMAN, well known under the name of the "Blind Traveller," was a special illustration of the pursuit of knowledge under apparently insurmountable difficulties. At the age of twenty-five he was obliged to leave the naval service, a profession of which his active mind and singular aptitude for the acquisition of practical information would have rendered him a distinguished ornament. The illness which ended in the total deprivation of sight resulted from the anxious discharge of his professional duties. At first some hope was entertained that his sight would be preserved, but when at length it became certain that there was no prospect of recovering the power of vision, his resolution to adapt himself to these distressing circumstances showed at once that mental courage which was afterwards so remarkably developed. The appointment as a Naval Knight of Windsor seemed to afford an easy retreat from turmoil to a person in his circumstances. But the seclusion of Travers College was ill-suited for his anxious mind; and his bodily health also suffering from that routine life, he obtained permission to travel. His first journey, made in the years 1819, 1820, and 1821, was through France, Italy, Switzerland, and parts of Germany bordering on the Rhine, Holland, and the

Netherlands. The narrative of these travels went through four editions.

In his next journeys he traversed Russia, Siberia, Poland, Austria, Saxony, Prussia, and Hanover, during the years 1822, 1823, and 1824. While passing through the Russian territories he was suspected to be a spy, and was conducted as a state prisoner from the interior of Siberia to the frontier; having penetrated during that journey to 1000 miles beyond Tobolsk. Nor is it the least wonderful feature in these enterprises that, although when at home he was always attended by a servant on whose arm he leaned, he never on any occasion took a servant abroad, always travelling alone, and trusting to his own sagacity, and the sympathy which never failed him wherever he went, for safe conduct through all emergencies and perils. His Russian travels, curious in their details and full of adventure, ran through three editions.

In 1834 he published his principal work, recording a still wider field of research, entitled a 'Voyage Round the World,' in four volumes. This publication was dedicated to Queen Victoria, through whose kindness he had previously obtained a dispensation from residence at Windsor; an act of gracious protection which he spoke of to the last hour of his life in terms of deep gratitude. The 'Voyage Round the World' may be considered his most elaborate production. It embraced the Journals of a vast route, including Africa, Asia, Australasia, and America, as explored between the years 1827 and 1832; and is, in reference to the mass of information it contains, and the peculiar situation of the author, an extraordinary literary monument of energy and perseverance.

Although Lieut. Holman had now twice circumnavigated the globe, visited most countries, and made himself familiar with their geography, internal industry, and external relations, the passion for exploring distant scenes and gathering fresh information survived even the physical strength necessary to its safe indulgence. Of him, indeed, it may be said, that his eager soul subjected its feeble tenement to the severest tests. Few men of the strongest constitutions could have endured the fatigues which the Blind Traveller voluntarily undertook; and at an age when most men seek repose, he was still found in motion, on the Danube or near Constantinople; attending to the processes of wine making in Portugal, or visiting the scene of some Scriptural tradition at Jerusalem. His last journeys were made through Spain and Portugal, Wallachia, Moldavia, and Montenegro, Syria and Turkey, and his final employment was the



preparation for the press of his later journals, which experience and matured observation had rendered more valuable than any of his former records of travel. The whole of these, and a large mass of miscellaneous papers, are in the hands of his friends, and it is to be hoped they will be given to the public, accompanied by an adequate biography of this remarkable man. The character of Licut. Holman was eminently calculated to command respect and conciliate attachment. Patient, gentle, and firm, he was beloved by his friends, and won the confidence and regard of the numerous and varied circles by which he was at different times surrounded.

Mr. Joseph Ravenscroft ELSEY, who died in January last in the West Indies at the early age of twenty-four, had already distinguished himself as a naturalist and explorer, as recorded in our Journal.

Educated at the London University and College of Chemistry, and passing at the Royal College of Surgeons, he was appointed as surgeon and naturalist to the North Australian Expedition, under our Medallist, Mr. A. C. Gregory. The zealous and efficient manner in which he fulfilled the arduous duties attached to his post, during twenty months of toilsome travel, won for him the high praises of his commander, and the friendship and admiration of his associates. On his return to England he communicated a paper to this Society on North Australia, and was soon after offered the appointment of Government surgeon at Seychelles, which he however declined, preferring to go to the West Indies, with a view to the collection of natural history specimens. He had scarcely been six weeks at his post when he was attacked with what at first appeared a slight illness, but which soon terminated fatally; and there is too much reason to believe that his untimely end was attributable in great measure to over-fatigue and privation when engaged in the North Australian Expedition.

The late Earl SHELDER, K.G., was born at the Admiralty, Whitehall, his father having for many years presided over that department of the Government. He adopted the Navy as his profession, entering that service in 1811, a few months before he attained his fourteenth year. In September, 1825, he was appointed to the command of the *Talbot*, 28. While in that ship he served in the Mediterranean, under the late Admiral Sir Edward Codrington, in which he fought with distinction at the battle of Navarino, was present at the capitulation of Patras, and assisted at the reduction of the Morca Castle. For his conduct at the battle of Navarino the

noble Earl received the honour of C.B. In the latter years of his life he served as Lord High Steward of Her Majesty's Household, and was made a Knight of the Garter. Feeling that his health was rapidly giving way, he retired from office, and shortly after, on the 27th December, 1857, he expired, to the regret of his Sovereign and his numerous friends.

William Wilberforce Bird, who was born in 1784, was the eldest son of W. Wilberforce Bird, of the Spring, Kenilworth, and Member for Coventry. In his boyhood he was at school at Warwick, but was sent to complete his education at Geneva. In 1802 he was nominated a member of the East India Civil Service, and went to Calcutta in 1803. After passing through the College of Fort William with considerable distinction, he was stationed at Benares, where he was early placed in situations of singular difficulty and importance. On one occasion, in the year 1809, a religious disturbance broke out, attended with great destruction of life and property, and it became necessary to call out the troops, whom he personally conducted into the heart of the city, and was enabled to disarm and disperse the infuriated people, and restore tranquillity. On another occasion an insurrection, in resistance of the introduction of the house-tax, which threatened very alarming consequences, was put down through the exertions of Mr. Bird; the multitudes being dispersed without the loss of a single life.

For these services Mr. Bird received the highest approbation of the Government for "the prudence, firmness, zeal, activity, and judgment which had marked all his proceedings." After this time, Mr. Bird was selected for other important situations, where peculiar fitness was required; and having been successively placed in the highest offices, both judicial and financial, was at length appointed a member of the Supreme Council of India, of which, in the absence of the Governor-General in the North-West Provinces, he became the President, and was four times nominated Deputy-Governor of Bengal, with the duties of which office he was entrusted during the whole period of Lord Ellenborough's administration. When that nobleman was recalled, Mr. Bird succeeded him as Governor-General of India until the arrival of Sir Henry (the late Lord) Hardinge, whose first act was to re-appoint him Deputy-Governor of Bengal. Mr. Wilberforce Bird took a prominent part in all the great questions of the time, and was particularly instrumental in the abolition of suttee, the suppression of

slavery, the discontinuance of state lotteries, the extension of Native education, and the more general employment of well-qualified Natives in the administration of public affairs. In 1844, having been in the service of the East India Company forty-one years, he retired, and returned to England. On his departure from Calcutta, addresses were presented to him by the European and Native inhabitants, expressive of their sentiments of respect and esteem for his character and conduct, both as a public officer and a private gentleman. He passed his remaining days in the privacy of domestic life, beloved by all his friends, and particularly by his associates of the old Ralagh, now the Geographical, Club. He died in London, after a few hours' illness, on the 1st June, 1857, aged 73.

The Rev. Dr. SCORESBY.—Although it is not my bounden duty to offer to you sketches of the lives of our countrymen who have not been members of our body, yet when a very remarkable explorer, voyager, or geographer, who has not joined us, is taken from this world, I follow the practice adopted some years ago of attempting to bring the striking points of his character to your mind's eye. A man eminently entitled to be thus singled out was the late Dr. SCORESBY, who, at the early age of ten years, commenced his career as a seaman under the auspices of his father, one of the most successful captains of the port of Whitby in the Northern whale fishery. Thus early inured to the hardships and perils of the Arctic seas, his mind was developed by the employment of the winter months in pursuing a course of study at the University of Edinburgh, where his assiduity and ability gained him the friendship of the professors, and laid the foundation of that knowledge which enabled him subsequently to offer in so admirable and clear a manner an account of the Arctic regions.

As chief mate of his father's ship, the *Resolution*, he had the honour of navigating to the highest northern latitude then attained by any vessel, viz.  $81^{\circ} 30'$ ; and though Sir E. Parry, in his celebrated boat expedition during his fourth voyage in 1827, arrived at  $82^{\circ} 45'$ , the distinction of being second in the approach to the Pole yet remains with Scoresby and his father.

The account of the Arctic regions, being the result of 17 years' experience in those seas, appeared in 1829, in two volumes; and besides a vast amount of statistical information relative to the whale fishery, then the most important nursery for our seamen, this work contains so great a mass of scientific observation that it is still a text-book of nautical science.

In 1822 he succeeded in reaching the east coast of Greenland, which, by his indefatigable labours, was laid down on charts from the 70th to the 75th degree of latitude, and, taking in the bays and fiords, a coast line of 800 miles was defined correctly, and errors of previous charts, amounting to no less than  $7^{\circ}$  of longitude, corrected. An account of this remarkable voyage (dedicated by permission to King William the Fourth) was published the following year; and in a copious appendix, the pages devoted to mineralogy, botany, zoology, and meteorology, evince to what great profit the author had studied at Edinburgh.

In the course of a visit to the island of Jan Mayen, Scoresby detected one of the most remarkable proofs of the effect of the equatorial current. He found on the shores of that singular island (recently visited by Lord Dufferin) pieces of drift wood bored by a ptenus or pholas, neither of which animals ever pierce wood in Arctic countries, and hence he concluded that the worm-eaten drifted fragment had been borne by currents from a transpolar region. The notion of a constantly open polar sea Dr. Scoresby always believed to be chimerical.

He was the first also to attempt observations on the electricity of the atmosphere in high northern latitudes, and his experiments made with an insulated conductor eight feet above the head of the main-top-gallant mast, connected by a wire with a copper ball, attached by a silken cord to the deck, are still regarded with interest for their novelty and ingenuity.

This collection of scientific data was never permitted to interfere with the main objects of the voyage, in the pursuit of which he was most successful, and, notwithstanding a resolute determination, that the sanctity of the Sabbath should never be violated by the pursuit of the whale, his ship usually returned the fullest of the season. Some idea of his constant zeal may be found in the expression which he uses, that, when he went into the ice, he considered it was his own watch on deck until extricated at the close of the season.

Abandoning nautical pursuits in the year 1823, Mr. Scoresby gave a fresh and remarkable proof of his unbounded energy and great ability by mastering the difficulties attendant upon the adoption of the career of a divine. Setting to work with the assiduity of youth, he graduated at Queen's College, Cambridge, as B.D., in 1834, and was inducted to that Church of England of which he became a distinguished ornament. In short, he devoted many years of his life to the arduous duties of chaplain among seamen, whose religions wel-

fare he most zealously promoted; his sermons, while they breathed the true spirit of Christianity, being strengthened by a tone of philosophical reflection which imparted to them much dignity and freshness.

In the progress of Arctic exploration Scoresby continued to take the deepest interest. Although he had thought, from the first, that the attempts to find a North-West passage to the China Seas would prove to be unprofitable for political or commercial objects, he considered that the scientific results justified all the risk and expense of such expeditions; maintaining that, even in regard to financial returns to the nation, the establishment of the Davis Strait fishery and of the trade of the Hudson Bay Company had compensated for the expenditure of public money in the early voyages of discovery.

The scientific career of Dr. Scoresby in the latter years of his life is well known. He became a Fellow of the Royal Society in 1824, and subsequently was elected a Correspondent of the Section of Geography and Navigation of the French Academy of Sciences. The Edinburgh Philosophical Journal and various scientific periodicals were enriched by occasional contributions from his pen on a variety of subjects of natural history and meteorology. To the observations of magnetical phenomena he had long devoted close attention, and his investigations, published at intervals from 1839 to 1843, and the concluding volume in 1848, contain a vast amount of valuable materials for sound induction. His reports to the British Association, at the meetings of which body he was a frequent and welcome attendant, and his numerous observations on the influence of the iron of vessels on the compass, were connected with inquiries of the utmost practical importance to navigation. It was in prosecuting these researches, and with a view to determine various questions of magnetic science, that Dr. Scoresby undertook a voyage to Australia, from which he returned last year, with his constitution much enfeebled by the arduous labours he had undergone.

Of this good man we may truly affirm that his name will ever be remembered with honour among those who by their character and services have sustained the reputation and extended the influence of the British name by the peaceful triumphs of science and philanthropy.

Dr. Baron von REBEN was born in the beginning of the present century, in the kingdom of Hanover, and was well known for his good statistical and geographical works on Germany, Austria, and Russia. He was chief director of the Statistical Bureau in Vienna, and possessed a considerable private collection of valuable ancient

and modern geographical maps, was a Vice-President of the recently-formed Imperial Geographical Society of Vienna, and died unexpectedly a few months since.

At the last Anniversary, I laid before you a brief sketch of the discoveries of the ardent young explorer and good astronomical observer VOGEL, and reported the rumours of his death, but hopefully threw doubts upon their accuracy. Alas! they have proved too true; and since then the assassination of his faithful assistant Maguire, who was bringing home many geographical records, has cast a sad gloom over the exploration of Central Africa, and teaches us how grateful we ought to be for the escape of even the living traveller, Barth, who is now giving us so much information respecting those turbulent tribes.

The death of Vogel appears to be placed beyond a doubt by the account of the envoy of the King of Darfur, who arrived last autumn on an amicable mission to the Viceroy of Egypt. He relates the rumours which had reached him before he left Darfur, and repeats their details with minuteness. Much of his account refers to the proceedings of Dr. Vogel's colleagues; and as we know that what relates to Barth is accurate, there appear to be no grounds for doubting the truthfulness of the remainder, especially as the place where Vogel is said to have been executed by the order of the barbarous King of Wadai is at no great distance from Darfur.

Edward Vogel was the eldest son of Professor C. Vogel, Director of the Public School in Leipsic, where he, at an early age, exhibited a strong predilection for astronomy, there being a good observatory in that city. He afterwards completed his studies under the celebrated Eneke at Berlin. Concluding his academical training, he came to England, I believe, in 1851, and was employed in the observatory of Mr. Bishop until he was sought out to proceed to Africa early in 1853, and join Drs. Barth and Overweg.

On the eve of his departure, when he was full of ardour and hope, I made his acquaintance at the house of his patron the enlightened Prussian Minister, Chevalier Bunsen, when his ingenuous manners, intelligent conversation, and knowledge of the natural history sciences, in addition to sound astronomical acquirements, led me to conclude that he was admirably qualified to carry out his mission, particularly in determining the geographical position of many places in Africa. Alas! that he is not only taken from us, but that with him and poor Maguire we lose a great portion of the results of his arduous explorations and accurate observations.

M. von Neimen, a young German gentleman of good family,

who went to Egypt solely with the noble object of penetrating to Darfur and Wadai, there to ascertain the fate of Vogel, I regret to say, died of a lock-jaw at Cairo.

The fate of the faithful and intelligent Corporal Maguire has been already narrated to you in our Proceedings. In his last moments he exhibited the same unflinching tenacity and bravery which had marked his conduct throughout. Appalled by no sickness and intimidated by no foe, this fine specimen of a British soldier killed several of his murderous assailants before he lost his own life.\*

### GEOGRAPHICAL PROGRESS.

*Britain—Admiralty Surveys.*—Following the plan of my last year's Address, I begin with the account of the Maritime Surveys of Britain, for the substance of which I am indebted to my eminent friend Captain Washington.

The Coast Surveys in course of execution under the orders of the Admiralty both at home and abroad have made steady progress during the past year. They are conducted by twenty different surveying parties, one-half of which are employed on portions of the United Kingdom, the remainder in the colonies of Australia, Cape of Good Hope, West Indies, Nova Scotia, St. Lawrence, and Vancouver Island, also in the Mediterranean, Coast of China, and Red Sea.

*British Isles.*—The Coast Survey of the United Kingdom has reached a point at which we can confidently predict that a very few more seasons will place the public, and all who take an interest in geography, in possession of a complete representation of the British Isles, not only as their shores, islets, and rocks rise above the level of high water, but also as the whole group reposes upon a bed circumscribed by a boundary line of 100 fathoms in depth.

The study of the configuration of that line is instructive. It shows that the group, although apparently broken up into three large, and countless small, islands, is physically connected on the south-east, through Belgium and Holland, with the continent of

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\* Among others lost since the last Anniversary are Sir Chas. M. Clarke, Bart., M.D.; C. E. Rumbold; Nicholas Garry; Algernon Greville; E. J. Harrington; J. Macgillivray; Joseph Reynolds, and N. F. Simmons, Esqrs.; Capt. W. L. Herndon, and Lieut. J. G. Strain, of the U. S. Navy; and General Oberreit and Colonel Falkenstein, both of Saxony, and both Honorary Members of this Society.

Europe, while it is separated from Norway and Sweden by a gulf or fiord some hundred fathoms in depth. Probably it may not be generally known that some of the deep wells in London and Sheerness draw their fresh water from a stratum which lies fully 300 feet below the level of the bottom of any portion of the North Sea that intervenes between this island and the coasts of Belgium, Holland, or Denmark. The physical geographer will therefore find, if he examines them, that nautical charts teach something more than the mere depth sufficient for the wants of navigation. This undoubtedly is their first and main use; but in the course of a rapid summary of their labours during the past year, I shall be enabled to show you that the Admiralty Surveyors have sounded hitherto unfathomed depths both in the North and South Atlantic, in the Indian Ocean, and in the Red Sea, and have brought up sufficient of the bottom to enable geologists to explain the structure of new continents, now forming at a depth of 2000 fathoms below the surface of the water.

*England.*—The re-examination of the river Thames, to which I referred last year, under Commanders Burstal and Cudlip, has been completed from Putney to Woolwich, and laid down upon the large scale Ordnance plans of 60 inches to a statute mile—a minute and careful survey, which will form a valuable standard for reference hereafter, when the labours of the Thames Conservancy Board shall have dredged a deep, uniform channel, navigable at low water up to the London Pool. The deepening of the bed of the river, consequent upon the removal of old London Bridge in the year 1832, has been striking, and holds out encouragement to reconstruct the old-fashioned bridges at Newcastle, Wexford, and Cork, which now act as dams in their respective rivers, as the Tyne, the Slaney, and the Lee.

On the east coast of England the chief topographical changes consist in the improvement of the entrances of the several tidal harbours. The channel of the Tees has been dredged and trained to a fair curve, which can hardly fail to deepen itself. A chart of Tees Bay, on the scale of 3 inches to a mile, has recently been published at the Admiralty. It includes Hartlepool and Redcar, and thus shows at one view all the sites that have been recommended in this immediate locality for a harbour of refuge—an imperative work that can no longer be delayed, when we look at the fearful loss of life from wreck that annually occurs on this coast. At the entrance of the Tyne large works are in progress, which we trust may do somewhat to improve the mouth of that important river, in



and out of which no fewer than 45,000 vessels pass yearly—a traffic only paralleled by that of the ports of London and Liverpool. At Blyth, too, much has been done to improve the entrance, and to guide the flood and ebb streams into one channel.

On the south coast of England the surveying party under Commander Cox and Messrs. Usborne and Davis are still engaged in the examination of the inner portions of Plymouth Sound, including Catwater and Hamoaze, as far as Keyham, in the course of which they have examined 27 miles of harbour coast-line, and sounded over 50 square miles. In Cornwall Captain Williams and Mr. Wells have surveyed 15 miles of the open coast from St. German in Beacon westward to the entrance of Fowey, with plans of the small harbours of Charlestown, Par, Pelkerris, and Polperro, and sounded over 47 square miles. At the northern entrance of the Bristol Channel, Commander Aldridge and Mr. Hall have been employed on the rocky passage known as Jack Sound, where they have mapped 21 miles of open coast line, and sounded over 40 square miles, discovering many dangerous rocks hitherto not marked on our charts.

Farther north, on the West coast, Mr. E. K. Calver has sounded the new refuge harbour of Holyhead, which already has afforded shelter to 3500 vessels during the past year, and is daily more resorted to as it becomes known. He has also resounded the packet-harbour at Portpatrick, and has generally examined the coast and harbours between Bardsey Sound and Ardrossan, including the newly-formed harbour at Silloth, on the English side of the Solway Firth, and has shown that there exists a channel, having 15 feet at low water, for which the mariner, in case of need, may safely run his vessel at a time when the tidal harbours along this portion of the coast cannot be approached.

*Scotland.*—In Argyshire Commanders Bedford and Creyke and Mr. Bouchier have been employed on the coasts of Mull, Iona, Ulva, and Loch Erive, with the numerous adjoining islets, in the course of which work they have surveyed 112 miles of sea-coast and loch, and sounded over 90 square miles. In the detailed statistics which Commander Bedford has furnished of the progress of this season's survey, he states that the soundings were obtained by one officer, Mr. Bouchier, and his boat's crew; and it may give some notion of the minuteness of the survey, when I mention that, in the space of 90 square miles, they took 13,000 casts of the lead, the greatest depth being 97 fathoms. The neces-

sarily slow progress of the survey of these intricate coasts will be better understood perhaps from this single fact than from any general description that I might give.

In Inverness-shire Commander Wood and Mr. Forbes have surveyed 15 miles of the open coast of the Isle of Skye, from Loch Eishart westward to Loch Breatal, including the Soay Isles and the remarkable Lochs Scavaig and Coir-uisk (so admirably described by Walter Scott), and sounded over 83 square miles, reaching six miles off shore, and into a depth of 140 fathoms; while Mr. Jeffery has examined 40 miles of coast between Malag and Ru Arisaig, including the shores of Loch na Gaul.

In the Hebrides Captain Otter in H.M.S. *Porcupine*, with her tender the *Seagull*, assisted by a good working staff, composed of Messrs. Dent, Stanton, Stanley, and Cramer, has examined the shores and islets of the Sound of Harris, comprising, with all their indentations, 155 miles of coast line, in addition to sounding over an area of 435 square miles. This is an important service rendered to hydrography, as with this chart and the accompanying sailing directions before him, the mariner may safely run for the passage between Harris and North Uist, which has hitherto been avoided by all who could possibly escape from it. The chart is in the engraver's hands, and will be issued to the public in the course of the summer. At the same time Lieut. Thomas and Mr. Clifton have surveyed the rocky estuary of East Loch Tarbert, in Harris, and completed a chart of that remarkable inlet of the sea.

In alluding to these and other charts of the coasts of Scotland, I have real pleasure, as one acquainted with the value of detailed land surveys, in expressing my admiration of the maps on the six-inch scale, exhibiting all the physical features, which Captain Otter, Commander Wood, and their associates have laid down for three miles inland. Such terrestrial coast surveys may enable geologists to come to accurate conclusions respecting the general structure of Scotland before the geographical details can be worked out on Ordnance maps representing the interior of the country, and which will probably not be published for many years to come, even under the vigilant superintendence of Colonel James.

In the Orkneys no new survey has taken place; but six plans of the most important anchorages, surveyed in the year 1850 by the late Commander Thomas, have been published by the Admiralty during the past year; they are Otterswick, Pierowall, Stromness, Deer Sound, Long Hope, and the approaches to Kirkwall, all on a

scale of three inches to a mile; with these charts, and guided by the lights, buoys, and beacons recently placed in these islands by the Commissioners of Northern Lights, the mariner may boldly run in case of need for the many sheltered anchorages which this group affords.

*Ireland.*—On the east coast of Ireland Messrs. Hoskyn, Aird, and Yule have completed the survey of Lough Carlingford, the coast adjacent, and the river up to the town of Newry, sounding over an area of 62 miles. In the course of this work a new deep-water channel, having 18 feet at low water, was discovered leading into the lough, which may materially aid in the execution of a plan which, it is understood, is shortly to be carried out, of rendering Carlingford Bay a harbour of refuge for the Irish Sea—an object greatly to be desired, and which might be effected at a trifling cost.

In Donegal, on the north coast, Captain Bedford, with Lients. Sidney and Horner, have mapped 50 miles of the shore line between Loughs Swilly and Foyle, including the remarkable promontory of Malin Head, and the Garvan and Innishtrahull group of isles, in the progress of which work 220 square miles have been sounded over, extending to 10 miles off shore. At the risk of being tedious, I must again be permitted to call attention to the statistics of this survey, during which more than 23,000 casts of the lead were taken, or on an average 35 casts to the square mile in deep water, and 625 casts to the square mile when within a depth of 10 fathoms. These are facts apparently trivial, but which all physical geographers, who care to have a *bonâ fide* representation of the submarine hills and valleys of our planet, will know how to appreciate. By permission of the Admiralty, the charts resulting from these surveys have been exhibited at our evening meetings, and have deservedly elicited your applause.

Those who are curious in such matters may like to know that the whole cost of such a survey to the country, including the soundings, when conducted in the most economical manner, is about 30*l.* per mile of coast line.

In Kerry, on the south-west coast, Commander Edye, with Messrs. Maedougall and W. B. Calver, have examined 26 miles of the exposed coast of that long, projecting peninsula which separates Tralee and Dingle bays, its extremity forming the westernmost point of the mainland of the British Isles. They have also mapped Smerwick Harbour. On this coast the chart of Kenmare river, the

work of the late Commander Church, has been published during the past year, and gives a graphic representation of that remarkable region, interesting both to the geologist and geographer.

The coast of Kerry has just now another and a deeper interest, as Valentia has been fixed upon as the Eastern or European terminus of the Atlantic Electric Telegraph cable, which it is proposed to submerge in the course of the next month, and on this occasion, we heartily trust, with complete success, as the first experiment afforded many useful hints which will now be taken advantage of. The preparatory line of soundings, to which I referred last year as about to be undertaken by Commander Dayman, was most successfully completed in H. M. S. *Cyclops*, which carried a line of deep-sea soundings across the Atlantic from Valentia to Newfoundland, the detailed account of which has been published and largely circulated, and therefore is probably familiar to many of my hearers. As I shall, in the sequel, treat of the natural history results of this survey, under the head of Physical Geography, I will only say that the shelf or bank on which the British Isles repose was found to extend to the westward as far as the meridian of  $15^{\circ}$ , or about 180 miles off shore, when it suddenly dropped from a depth of 500 to 1500 fathoms. From the foot of this submarine cliff the bed of the ocean held an undulating course, varying from 1500 to 2400 fathoms, which depth was reached in long.  $26^{\circ}$  W. From this point of greatest depth the bed of the ocean gradually rises until, in long.  $50^{\circ}$  W., it reaches the outskirts of the bank on which the island of Newfoundland rests; it is round to the north of this shoal that the telegraph cable is destined to pass into Bull Harbour, near the south-western angle of Trinity Bay. Fully appreciating the value of Commander Dayman's soundings, and experience as a pilot, the directors of the Company have made it a special request to the Admiralty that this officer, now in command of H. M. S. *Gorgon*, may be allowed to accompany and precede the U. S. ship *Niagara*, with the western portion of the cable (after the junction has been made in the mid-Atlantic), and pilot her to her destination. You will doubtless all join with me in heartily bidding them God speed.

*Mediterranean.*—Of foreign surveys the Mediterranean claims precedence, as its shores were the earliest seat of civilisation, and must interest alike the antiquarian, the scholar, and the geographer. Notwithstanding the classic works of Beaufort, Smyth, and their successors, we have yet only imperfect surveys and vague accounts of a large portion of this region. In last year's Address I had

occasion to make honourable mention of a survey of the Delta of the Danube in the Black Sea, by Lieut. Wilkinson, under the orders of Captain Spratt. This has now been completed for the Kilia branch as well as for the Sulina and the St. George; and the facts brought to light in the course of the survey of the advance of the alluvial delta in one part, and its washing away by the inroads of the sea in another, have been usefully turned to account by Captain Spratt, in his Report 'On the Comparative Condition of the Branches of the Danube,' as a warning to the engineers engaged in the improvement of that river to be careful how they place ponderous stone walls on so unstable a foundation. At the same time it is shown, that with simple guiding, and a free use of the dredging-machine, there is a fair probability of the Danube being so improved, that vessels of moderate draught of water may load their corn at Galatz, and convey it without transshipment to Western Europe in safety. The plans which I have mentioned, by Lieut. Wilkinson, will doubtless be in request at the approaching Paris Conferences on the subject of the Principalities, and will well repay the labour of those who consult them.

Following up his deep-sea soundings of last year to the eastward of Malta, Captain Spratt has made some experiments on the surface and submarine currents of the Sea of Marmora, in which he shows that the surface current gradually diminishes and vanishes at a depth of 40 fathoms, and that no counter current is found below; also that the density of the water is not perceptibly greater from that level to the depth of 1500 fathoms: from which depth he has brought up by his sounding-lead some beautiful specimens of minute, delicate shells of *Cleodora*, *Limacina*, *Spiralia*, *Atlanta*, &c.

The survey of the eastern half of the large island of ancient Crete, or Candia (the Kirit Adassi of the Turks), by Spratt, Mansell, and Wilkinson, has been published at the Admiralty during the past year, and for the first time we have an accurate representation of that fertile and beautiful island (with Mount Ida towering to a height of 7000 feet), which was formerly so populous and civilised that Homer \* speaks of its hundred cities, *Κρήνη ἑκατομπολις*. In modern times, and we trust before the close of the present summer, this island is destined to form the connecting link between the lines of submarine telegraph that are to unite Constantinople and Alexandria.

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\* See notice of Crete, by the Right Hon. W. Gladstone, in his new work on the Odyssey.

On the coast of Egypt Commander Mansell, with Messrs. Brooker and F. Skead, his assistants, have mapped the shore from Alexandria to Damietta, with plans on a large scale of the Rosetta mouth and the Bay of Abukir; this completes the coast as far as El Arish, and forms a positive and important acquisition to our knowledge of the geography of these regions. I may here mention that Captain Spratt has recently drawn up a Memoir on the proposal for a Suez Canal, in which he disposes of the fallacious argument, that because the Delta of the Nile does not sensibly advance on the sea, therefore the river has ceased to bring down alluvium, by showing that the Delta has advanced to such a point that the stroke of the sea, arising from the prevalent winds, is sufficient to keep it in check, but that the detritus is still brought down and carried away to the eastward, and forms dunes and sandhills which, at Kas Burún, rise to a height of 270 feet above the level of the sea. The survey of the coast of Egypt having been finished, we trust that the time has arrived when the shores of Palestine and Syria will no longer be permitted to form the opprobrium of our maps, and that, in the middle of the nineteenth century, we shall at last ascertain the accurate geographical position of such ports and places as Tyre, Sidon, &c., the names of which are found in some of the earliest records of the human race.

*South Africa.*—In the Cape Colony Mr. Francis Skead has surveyed the entrance of the St. John River, or Umzivubu, on the south-east coast, and has begun a closer examination of Table Bay. But the further survey of the coast to the eastward is paralysed by the want of a land survey of the colony, notwithstanding that each year as it passes away proves more strongly than the last that this want bars the progress of the settlers, hinders the development of the revenues of the district, and is attended with loss to the colonial exchequer. No one knows this better than Mr. Maclear, the enlightened astronomer at the Cape Observatory, and every time he sends home a fresh sheet of the printed account of the remeasurement of Lacaille's arc of the meridian (which has now reached the 234th page) he expresses his regret at the want of foresight evinced in not going forward with this survey.

*Red Sea.*—The increasing demand for telegraphic communication with India has led to the despatch of a vessel to carry a line of soundings from Bab el Mandeb to Suez. Captain Pullen, R.N., of H. M. S. *Cyclops* (known to most of my hearers for his hardy boat expedition in the Arctic Sea from Point Barrow to the Mackenzie, in the

year 1849), was selected for this service. The ship being well fitted for deep sea sounding, a few deep casts were made in the Atlantic and in the Indian Ocean on the passage out. First the lead was dropped at the site of the *Devil Rock*, in the North Atlantic, which has been so often reported, and also at the *Hannah Shoal*, in  $10^{\circ} 7' N.$  and  $27^{\circ} 32' W.$ , and no bottom found with 2000 fathoms of line: these two *vigias* then, as far as a radius of 50 miles each extends, are swept from our charts. In  $4^{\circ} 16' N.$  and  $28^{\circ} 42' W.$  bottom was got at 2100 fathoms. In  $2^{\circ} 42' N.$  and  $28^{\circ} 44' W.$  bottom was struck in 1080 fathoms; at 5 miles south of the Equator also 1080 fathoms; these two casts are respectively at 90 miles north and south of St. Paul Isle. In  $4^{\circ} 16' S.$  and  $28^{\circ} 42' W.$  got bottom in 2100 fathoms; in  $26^{\circ} 46' S.$  and  $23^{\circ} 52' W.$  struck bottom in 2700 fathoms; this last sounding is important, as it is only 350 miles to the westward of a cast of 2426 fathoms, obtained by Captain Sir James Ross in the year 1839. In the Indian Ocean the casts obtained were 1400 and 1110 fathoms, near the supposed *Brunswick* and *Atalanta* Shoals, which do not exist; in  $16\frac{1}{2}^{\circ} S.$  and  $59^{\circ} E.$  got bottom with 1400 fathoms; in  $5^{\circ} 30' S.$  and  $61^{\circ} 40' E.$  bottom in 2254 fathoms, thus proving the non-existence of the *Rose*, *Galley*, *Swift*, and *Bridgewater* Shoals.

*Ceylon*.—Although no new surveys of this coast have recently been made, yet a valuable addition to the hydrography of this island arises from the publication at the Admiralty of two charts, on a scale of a quarter of an inch to the mile, extending from Colombo on the west, round the south coast, including the dangerous shoals named by the Portuguese the *Bassas*, and the east coast, comprising the rocks near Pigeon Island, off Trincomalee (where the *Ava* was recently wrecked), as far as Point Pedro. A new plan has also been compiled from various authorities of the harbour at Point de Galle. We do not know with whom it rests to make a complete survey of these coasts, but, whether it lie with H.M. Government or the East India Company, no time should be lost in setting it on foot, if we do not wish to hear of other losses in addition to that of the *Ava*, although it does not appear that that wreck was in any way the fault of the chart.

*China*.—In my last Anniversary Address I had the satisfaction of announcing to you that Captain Bate, R.N., the surveyor of Paláwan, was appointed to H.M.S. *Actæon*, for the examination of the coast of Tartary. Alas, how little do we know of the future! Hardly had he taken command of his ship, and prepared for his campaign, when

the assault on Canton was determined on. Foremost as usual at the post of danger, he volunteered for the hazardous task of selecting a site for the scaling-ladders of the storming party, and in doing so approached so near to the city walls that he was shot dead on the spot. Thus was lost to his country as zealous a surveyor, as gallant an officer, and as good a Christian as any in Her Majesty's service. He has left behind him in his works a monument more durable than brass. So long as the mariner's route to China lies along the coast of Paláwan, and that he can thread with safety that labyrinth of coral reefs that skirts its western shore, so long will the memory of this accomplished officer be held in esteem. In an unfinished letter to the Hydrographer to the Admiralty, found in his writing-desk after his death, Captain Bate says "he hopes soon to sail for the *Pratas*, at the south-eastern approach to the China Sea, to determine the best site for a light on that dangerous shoal, which has caused the wrecks of so many vessels." As the light on *Pedra Branca*, at the south-western entrance of the China Seas, is known by the name of HORSBURGH, whose Sailing Directory and Charts have long been the guide of the mariner in the East, so would it seem to be a fitting memorial to the gallant officer who has sacrificed his life in his country's cause, that the lighthouse, shortly to be erected on the *Pratas*, should be known by his name, and that the mariner, who, by a friendly beacon, is thus warned off that dangerous shoal, should be reminded of him whose last thought was for the sailor's benefit, and have cause to bless the name of THORNTON BATE.

Immediately after the capture of the city, our staff of surveyors under Lieutenant Bullock set to work, and have now completed a trigonometrical survey of Canton; and have finished what was formerly left undone of the chart of the Chu-Kiang, or River of Pearls, as far as Whampoa. They have also, under Mr. Frederick Kerr, made a track chart of the river to the west as far as Fatshan and Sam-shui.

*Siam.*—The chart of the Gulf of Siam has been materially improved during the past year. Messrs. Richards, Inskip, and Reed in the *Saracen* have again visited Bangkok, where, as before, they received every attention and assistance from the enlightened rulers of that country, the two Kings of Siam; they have completed a plan of the city and of the river Menam, which has been published at the Admiralty, and they have determined the position of most of the islands, as well as many of the headlands and capes on the



western, as well as on the eastern, shore of the gulf. A table of maritime positions, just printed at the Admiralty, and embodied in the latest edition of the chart of the gulf, will enable all map makers to correct the hitherto almost unknown outline of the coasts of that kingdom.

In *Australia*, a survey of Port Jackson has been made by the officers of H.M.S. *Herald*, and is in course of publication at the Admiralty; some additions also have been made to the approaches to Princess Royal Harbour. Here, and on Breaksea Island, lights have just been established as a guide to the anchorage for the Australian mail steamers, which at present all call at this port on their homeward voyage.

*New Zealand*.—Detailed coast charts of the entire circuit of this group of islands, the fruit of ten years' labour of Captains Stokes and Drury, with their zealous staff of assistants, on a uniform scale of 5 miles of longitude to an inch, or on an average scale of one mile to a quarter of an inch, 13 in number, are now engraved, as are also a complete series of the numerous ports and havens dotting the extensive sea-board.

Those singular arms of the sea, forming a network of harbours on the south shore of Cook Strait, one of them Queen Charlotte Sound, famous as the chief place of resort of the circumnavigator Cook, are being engraved on a scale commensurate with their nautical importance, and on their completion, by the close of the present year, it may be considered that the hydrographic features of New Zealand are fully delineated.

In *Vancouver Island* and in the Straits of Juan de Fuca, Rosario, and the Haro Channel, a survey is in progress under Captain Richards, of H.M.S. *Plumper*, ably seconded by his staff of assistants, Messrs. Mayne, Bull, Pender, and Bedwell; the Bay of Semiahmu has been examined, and the site of the recently discovered gold mines fixed at some 50 miles up the river Frazer. On the Oregon coast two charts, for which we are indebted to the U.S. Coast Survey of this region, from Diego Bay to Vancouver Island, have been published at the Admiralty; and in the Gulf of California, Captain Harvey, in H. M. S. *Havannah*, zealously assisted by Mr. Hull, Master R.N., has rectified the positions of various points of that little known coast, which have been inserted in the charts.

In the *River Plate* Lieut. Sidney, R.N., has completed a plan of Buenos Ayres and its roadstead, which has been published; while

the results of the reconnaissance by Capt. Page, of the U.S. navy, in his ascent of the Paraguay and Paraná, published in America, have been immediately re-engraved and published at the Admiralty, in connexion with the former labours of Captain Sullivan, for the benefit of merchants and others desirous to open a trade with that rising and fertile country. New charts of Bahia and Rio de Janeiro, in Brazil, on a sufficiently large scale, from surveys by various naval officers, have also been recently published.

The position of that dangerous coral reef *As Rocas*, lying off Pernambuco, has been redetermined by Commander Selwyn, in H.M.S. *Siren*, and found to be in lat.  $3^{\circ} 51\frac{1}{2}'$  s. and long.  $33^{\circ} 50'$  w., just 100 miles from the Island of Fernando Noronha, which agrees very nearly with the position assigned to this islet by Lieut. S. P. Lee, of the U.S. navy. A beacon, 33 feet high, painted black and white, has been erected on the western island; and some cocoa-nut trees, planted in 1856 by Capt. Parish, are growing.

The attention of the astronomical world is just now greatly attracted towards this portion of South America, inasmuch as the total eclipse of the sun of Sept. 7 will be visible in that country. The path of the shadow of the eclipse, about 30 miles in width, will reach the continent on the Pacific side, a little to the southward of Payta in the stato of Equador, in about  $5^{\circ}$  south lat., and curving in a s.e. direction across the interior of the country, will quit the coast near Santos, in Brazil, in lat.  $25^{\circ}$  s. nearly. Perhaps the best position for seeing it will be from the summits of the coast range of the Andes, near Payta, shortly after sunrise on the morning of the 7th of September. It is with much gratification that I am enabled to add that the Admiralty, in the interests of science, have placed a steamer at Rio de Janeiro at the disposal of any *bond fide* astronomer who may be disposed to observe this rare phenomenon on the coast of Brazil. On the shores of the Pacific such aid is not necessary, as the regular mail steamer from Panama to Chile always touches at Payta.

*West Indies.*—In this archipelago of islands, perhaps the most important work during the past year is the publication at the Admiralty of a chart of the island of Cuba, in two sheets, on the scale of one-tenth of an inch to a nautic mile. It is compiled partly from the surveys of Captains Owen and Barnett, R.N., but principally from the Spanish charts, corrected by the maps of Pichardo and Coello. Lieut. Murray, in H.M.S. *Skipjack*, has also recently furnished some positions on the south coast. The above is only a

compilation, and confessedly imperfect; but there is little doubt but that it is far better than anything else that exists. It may be hoped that before long we may be enabled to improve it.

The survey of the island of Santa Cruz, by Messrs. Parsons and Dillon, is on the eve of publication, as is also a chart from St. Domingo eastward to Dominica, including Porto Rico.

*United States.*—Twelve sheets of charts and plans of harbours on the east coast of the United States of America, for which we are indebted to the admirable Coast Survey now so far advanced under Professor Bache, our medallist, have been published during the past year; they include the Delaware River, New York Bay, New London, and other places, the names of which, owing to the constant intercourse between the two nations, are familiar as household words.

*Nova Scotia.*—In the Bay of Fundy, Commander Shortland, with his staff, composed of Messrs. Scott, Pike, Scarnell, and Mourilyan, have surveyed the coast of New Brunswick from Quaco 25 miles easterly to St. Martin Head, also from Cape Chignecto to Cape Sharpe 25 miles, and from Port George to Cape Split, on the Nova Scotia territory, about 40 miles; they have also sounded over a space of about 300 square miles. Four sheets of the Bay of Fundy survey, on a scale of one inch to a mile, have been published during the past year.

On the eastern part of Nova Scotia and Cape Breton, Commander Orlebar, and his assistants Messrs. Hancock, Des Brisay, and Carey, have surveyed about 50 miles of sea and lake coast, including Great Bras d'Or, &c., sounding over 680 square miles. Two coast sheets and three plans of harbours, including Country Harbour, Whitehaven, and Miramichi Bay, have been published in the past year.

*Variation Chart.*—In continuation of the lines of equal magnetic variation, which have already appeared on the Atlantic, Indian, and Pacific Ocean charts, a Variation Chart of the World, to embrace this information so useful to the seaman and traveller, is being prepared for the present epoch by Mr. Fred. Evans, R.N., chief of the Compass Department at the Admiralty. It will comprise numerous observations recently made by various officers in H.M. navy, who have shown much assiduity in collecting materials. Of these we may especially mention an extended series made by Captain Richards and his assistants in the *Plumper*, on her voyage to Vancouver Island: by Mr. J. Lowy, master of H.M.S. *Calcutta*,

on her voyage to India and China; by Captain Ryder, in the *Duuantless*, in the Mediterranean; by Captain Otter, in the *Baltic*, North Sea, and Hebrides; and generally by all officers engaged in the surveying service. These observations, after the variation chart of the world is published, will be printed, so that those interested may be enabled to examine the data on which the chart is founded.

Besides the works above enumerated as in progress in different parts of the world, the labours of the Hydrographic Office during the past year have consisted in the publication of upwards of 80 new or corrected charts of various coasts, and plans of harbours; of annual lighthouse lists for all countries, compiled by Commander Duusterville, R.N.; of notices to mariners of new lights, or changes in them, prepared by Mr. G. Marsh, R.N., 1000 copies of which are weekly distributed; of tide tables, with daily predictions for 24 home ports, with the time and height of high water on full and change, for the chief places on the globe, computed by Mr. J. Burdwood, R.N., 1250 copies of which are distributed and sold; of various hydrographic notices of new rocks and shoals discovered, of maritime positions recently determined, all of which contribute materially to the benefit of navigation and the advancement of our knowledge of the physical geography of the globe.

*Ordnance Survey.*—During the last year the Ordnance Survey has been subjected, as I am informed by its able superintendent Colonel James, to another of those interruptions which for many years past have so marked its progress. In 1856 a committee of the House of Commons recommended that the series of plans which the National Survey should produce should, as respected Scotland, be—  
1. Plans of Towns on the  $\frac{1}{25000}$  scale, or 42 feet to an inch. 2. Plans of Parishes on the  $\frac{1}{50000}$  scale, equal 25 inches to a mile, or 1 inch to 1 acre. 3. Plans of Counties on the scale of 6 inches to a mile. 4. Map of the Kingdom on the scale of 1 inch to 1 mile.

During the year 1856-7 that series was in the course of rapid production and publication, when the House of Commons decided that the larger plans were to be discontinued.

Seeing that by Colonel James's recent introduction of photography the plans on the larger scales can be so economically and rapidly reduced to the smaller scales, whilst the extra cost of plotting the survey on the 25 inch scale instead of the 6 inch is so trifling in amount, the last Government advised the appointment of a Royal Commission, composed of men eminent in science or public affairs,

to inquire into and report upon the whole question of the scales of the survey; the members of the Commission having been Lord Wrottesley, the Earl of Rosse, Lord Brougham, the Lord Justice General, Vice-Chancellor Turner, the Astronomer Royal, the Right Hon. E. Cardwell, Sir Richard Griffiths, General Cameron, Mr. Brunel, and Mr. Vignolles.

It is to be hoped that the Report of these Commissioners, whatever it may be, will be adopted by Parliament, and considered a final settlement of this long vexed question.

The progress of the survey during the last year has, I regret to say, been greatly retarded in consequence of the reduction in the amount of the grant to the extent of 30,000*l.*, and the necessary discharge of upwards of 1000 surveyors and draftsmen.

In England, however, the publication of the large plans of the county of Durham is nearly complete; those of Yorkshire and Lancashire having long since been published. The survey is now proceeding in Westmoreland, Northumberland, and Cumberland: a large portion of each of the two former is already drawn, and will be shortly published; and as the surveyors have now got through the great manufacturing towns and the populous mining districts, and have the more open country before them, a much more rapid progress may be confidently expected, and the completion of the survey of the northern counties may be soon anticipated.

In Scotland, with the exception of a small portion of Lanarkshire and Roxburghshire, the survey of the following counties is complete: Edinburgh, Haddington, Linlithgow, Renfrew, Ayr, Dumfries, Berwick, Selkirk, Fife, Kinross, Lanark, and Roxburgh; and the work is proceeding in Forfarshire, Perthshire, Stirlingshire, and Dumbartonshire. In fact, with the exception of the narrow strip of country along the eastern borders of Scotland to the north of Aberbrothick, the greater part of the cultivated districts of Scotland has been surveyed and drawn either on the large scale of 25 or that of 6 inches to a mile.

The plans on the 6 inch scale are now immediately reduced to the 1 inch scale, and engraved, and I still hope, therefore, to see, in my day, the greater part of our country represented on a map properly so called. Several of the sheets of England and Scotland have been published during the last year, copies of which are in the Society's Map Office; and I beg specially to direct the attention of the Members to the manner in which the features of the ground have been delineated on the Edinburgh sheet, and also

on the Yorkshire sheets. I have been indeed much gratified to learn, that the point for which I have long contended is to be carried out, and that the vast and uncultivated area of the Highland mountains of Scotland is to be represented, when published, on the 1 inch scale only.\*

In Ireland, two thirds of the 1 inch map has already been engraved in outline, and more than one-third of the features of the ground has been sketched. The entire map in outline will probably be finished next year, and the engraving of the perfect map with the hill features is in progress.

*British Publications.*—At the head of the new geographical publications of our country I naturally place the new edition of the work on Physical Geography by Mrs. Somerville, which was last year announced as forthcoming. The varied phenomena of the physics of the globe are, as in the former edition, most logically and clearly put together by this gifted lady, whilst many new and important data are added; thus affording clear evidence that nothing has escaped her penetrating eye; her sound judgment and accomplishments enabling her to condense into a few lines passages descriptive of the great truths of nature. In short, for clearness of method, perspicuity of thought, and vast range of subjects, Mrs. Somerville's 'Physical Geography' must call for our warmest approbation.

The 'Letters from High Latitudes' by Lord Dufferin, which have appeared in the past year, constitute a volume of a very different character. The dashing and spirited manner in which my noble young friend sailed forth on his enterprise, and his gallant bearing when with his little yacht, the *Foam*, he was so fortunate as to traverse icy seas, from which the large steamer, the *Reine Hortense*, conveying Prince Napoleon, was obliged to turn back, the ardour with which he explored the lonely Isle of Jan Mayen, are all enhanced by the unaffected, captivating, and modest manner in which these feats are recorded. I rejoice, therefore, in the accession of Lord Dufferin to our body of working geographers.

Of Mr. Atkinson's remarkable labours in exploring vast tracts of Eastern Siberia and Chinese Tartary I had occasion to speak at our last Anniversary, when we first saw his striking sketches and paintings. In the mean time, by the publication of an admirably illustrated volume, he has so far made us familiar with

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\* See Journal of Royal Geographical Society, 1852, vol. xxii. President's Address, p. xc.

countries of great sublimity and wildness, as to incite geographers and naturalists to encounter the many obstacles which our countryman overcame, and bring us back accurate details respecting regions of which we, as yet, know little more than the merest outlines.

Although connected incidentally only with our subject, a work has recently been published which it would ill become me not to notice. The brilliant orator and elegant scholar who has given us his thoughts on the writings of the greatest poet of antiquity, has well said that "To pass from the study of Homer to the ordinary business of the world, is to step out of a palace of enchantment into the cold gray light of a Polar day:" for, whilst we may doubtless plume ourselves on our present geographical knowledge, when compared with that of the author of the 'Odyssey,' as delineated in the map attached to the volumes of Mr. Gladstone, we are forced to admit that whilst the moderns have made great and useful discoveries, and have vastly extended the domain of science, Greece, small as was her territory, has left behind her examples of the sublime and heroic, which, whether they be read of in the philosophic pages of Grote, or in the eloquent passages of Gladstone, have scarcely, if ever, been equalled by any succeeding nation.\*

Among practical consulting works and maps the following may be noticed. Blackie's Imperial Atlas has reached its twenty-seventh part, and is expected to be completed in the current year. It will then comprise a hundred separate maps, to which reference will be facilitated by an extensive index now in course of preparation. Mr. A. Keith Johnston has prepared a new General Atlas comprising a complete series of Modern Maps, of imperial size; five wall Maps of the present geography of Europe, Asia, Africa, America, and Australasia. Europe, the first of this series, is to be published immediately. Also a Geological Map of Scotland, by Professor James Nicol, which will be published in June, will contain a vast number of new data, as brought together by my distinguished geological associate.

An improved form of Fullarton's Gazetteer of the World in 1855 is now before the public. The Royal Atlas of Modern Geography has in its publication reached the 16th part, and will be completed in 22 parts. A recent map, showing at one view all the British possessions throughout the world, presents some features of novelty,

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\* 'Thoughts on the Study of Homer,' by the Right Hon. W. Gladstone, M.P. 1858.

particularly in the manner of overcoming the difficulty of representing so large a portion of the globe as one extended hemisphere, in the manner devised by Colonel James, R.E. The catalogue of the 'Literature of Geography' reaches to the completion of classified works on Africa. This collective view, furnished under the title of a 'Geographical Notice' by Dr. Norton Shaw, meets a great desideratum in the science. Of the numerous new maps or improved editions of older Surveys issued and prepared by our indefatigable associate, Arrowsmith, I will not now speak, as those who wish to study or possess such excellent works know that they have only to repair to Soho Square.

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### CONTINENTAL GEOGRAPHY.

*Russia.*—*The great Russian Measurements of the Arcs of Meridian and Parallel.*—The great Russian measurement of the arc of the meridian between the mouths of the Danube and the shores of the Polar Sea, to which I directed your attention in 1845, is fully described in the work by F. G. W. Struve,\* my eminent associate of the Imperial Russian Academy, and superintendent of the observatory of Pulkowa.

The progress of this measurement, one of the grandest geodesical operations of modern times, I formerly noticed up to the year 1845, when explaining the operations in Livonia, Vilna, Finland, and up to Tornea, the point, it will be remembered, which was the southern termination of the measurement of the arc by Maupertuis.

In 1850 General Tenner had the satisfaction to push his triangulation as far as the banks of the Danube, and thus conclude his highly creditable labours of 34 years' duration.

As the former measurements of the arc of the meridian in Lapland, by Maupertuis, and afterwards by Svanberg, do not correspond with the requirements of the age, it naturally appeared desirable to extend the Russian operations through Sweden and Norway towards the North Cape. For this purpose Struve obtained the cooperation of the Swedish Government; and thus the whole of the arc of

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\* This work is entitled 'Arc du Méridien de 25° 20', entre le Danube et la Mer Glaciale, depuis 1816 jusqu'en 1855, sous la direction de C. de Tenner, Lieutenant-Général de l'État Major Impériale de Russie; N. H. Selander, Directeur de l'Observatoire Royal de Stockholm; Chr. Haasteen, Directeur du Département Géographique Royal de Norvège; F. G. W. Struve, Directeur de l'Observatoire Central Nicolas de Russie. Ouvrage composé sur les différents matériaux, et rédigé par F. G. W. Struve. Publié par l'Académie des Sciences de St. Pétersbourg.'



meridian was extended to one of  $25^{\circ} 20' 8'' \cdot 2$ , reaching from Ismail on the Danube to Hammerfest on the northern shores of Europe. The length of this line, according to Struve's calculations, amounts to 1,447,786·78 toises. The chief meridian of the whole arc is that of Dörpat, which was accurately connected by chronometrical expeditions in 1854 with Pulkowa; the latter place having been previously connected by Struve in the years 1843 and 1844 with the observatory of Greenwich. The longitude of Dörpat Observatory thus obtained is  $1^{\text{h}} 46^{\text{m}} 53^{\text{s}} \cdot 53$  east of Greenwich.

One of the results of these operations is the very exact determination of a line of altitudes through Europe from South to North; and not the least striking fact among them is, that the Black Sea, the Baltic, and the Polar or North Atlantic Sea at Hammerfest, occupy exactly the same level.

Not less interesting is the Russian measurement of the arc of parallel or latitude extending from Bessarabia in the west, to the mouth of the Volga on the east. Of this work very little is known out of Russia; but the following reliable remarks have been furnished by Mr. Petermann, who obtained them from correspondents in that country. The mean parallel of these measurements is that of Züganesh, or  $47^{\circ} 30'$  North latitude, extending from Bessarabia, west of the Dniestr, by Vosnezensk on the Bug; Ushkalka on the Dniepr to Melekhovsk on the Donetz; thence it turns more towards north-east, reaches the left bank of the Volga at Sarepta, and extends along that river as far as Astrakhan. The elevations of this line are of great interest: from Züganesh, which is 1004 feet above the sea, the ground gradually descends as far as the Dniepr, on which Snamenka has an altitude only of 223 feet. Between this point and Kuznetsow the country rises to 825 feet at Medwäd, and beyond Kuznetsow presents a general level of 400 to 560 feet, till at Sarepta it suddenly descends from 427 feet to 63 feet, which remarkable descent was already shown by myself and colleagues in our work on the Geology of Russia. The line of measurement along the Volga first descends *below* the level of the Black Sea at Prishivinsk. This work being in connexion on the west with the Trigonometrical Surveys of Austria, Prussia, and France, the determination of a very considerable arc of parallel between the Atlantic shores and the Caspian Sea is thus established.

Along with these operations may be mentioned the recent conclusion of a very important line of trigonometrical observations extending from Stavropol across the Caucasus to Tiflis, Bayazid,

and the Araxes; and another line from Astrakhan to the mouth of the Terek, Danaya-bashi, and the mouth of the Kur. A comparison of the altitudes of these two lines is curious; for while all points of the Astrakhan line, as far as the mouth of the Terek, are below the level of the ocean, the former line passes over the Elbrus, 18,604 feet, and the Great Ararat, 16,965 feet above the sea respectively.

*Imperial Geographical Society of Russia.*—Under the Presidency of the Grand Duke Constantine, the Vice-Presidency of that eminent navigator Admiral Lütke, and aided by the zeal and intelligence of its Secretary M. Lamansky, this Society is truly the centre of many of the best scientific explorations of Russia; whilst by its activity we can best measure the remarkable progress of geographical knowledge in this vast empire.

The most important of its recent labours is the exploration of Eastern Siberia, commenced in 1854, and to which I alluded last year. This great work is still in progress, and will probably be completed this year. The vast region beyond the Lake Baikal, and in particular the north-east angle formed by the course of the river Lena and its affluent the Vittim, being a country very slightly known, most attracted the attention of the members of the expedition; whilst other explorations were also extended to the south-eastern frontiers of Siberia, and particularly to the course of the great river Amur. By the arrangements for the survey of the Trans-Baikalian tract, M. Smiriaguin explored the valley of Vittim from its central part to the Lena; M. Ussoltzoff visited the valley of the Nertscha and the superior course of the Vittim; whilst the course of the Bargousine in Northern Angara and its affluents was to be traced by M. Orlof. The object of this expedition was not only to develop the physical geography of this region, but also to collect natural history products and ethnographical materials; the members of the expedition being directed to acquaint themselves as far as possible with the domestic life of the nomadic population, and with their means of subsistence and of communication. At the end of 1855 two of the members (Ussoltzoff and Orlof) returned to Irkutsk with successful results; but Smiriaguin, whose mission was the most important, was assassinated, and all his collections lost—a deplorable event, which deprived the expedition of some of its most important results. Again, it unfortunately happened that the destined successor of Smiriaguin, M. Sondhagen, died of apoplexy before his departure for Siberia. But, notwithstanding such untoward circumstances, some results of the expedition are very inter-

esting. Lieutenant Ussoltzoff presented to the Society the journal of his travels from the mouth of the Nertscha to the mouth of the Bargousine, embracing about 1500 versts. He determined the geographical situation of the principal points, and collected valuable information about the nomades of Olekma and Karenga.

Lientenant Orlof also presented his itinerary, embracing about 2500 versts. It would be premature, says M. Lamansky in his memoir of 1856, to construct on these data alone a map of the valley of the Vittim, before the longitude of the river is determined. Nevertheless, if we compare the new sketch maps, prepared by the travellers, with the old maps, we observe some important changes. Thus, the sources of the Nertscha Yablonoi-Krebet were not ascertained before, and the neighbourhood of the Lake Baountof was totally unknown. It can now, however, be said that the geographical positions of all the principal points of the Trans-Baikalian district are determined.

Among these researches, the natural history descriptions and collections of M. Radde are fraught with deep interest. Commencing his observations in 1855, in the basin watered by the Lower and Upper Angara rivers, which fall into the Lake Baikal, M. Radde also explored the borders of that internal mass of water which are now rendered familiar to us by the striking paintings of Atkinson. The following year (1856) was entirely devoted to an examination of a region extending along the frontiers of China, from the Yablonoi mountains by the Argon river, a tributary of the great Amur. In this long tour he made zoological and botanical excursions into the elevated mountains of Tchokondo, the steppes of Abbagaitouy, the Lake of Torey, and the environs of the Dala-Nor Lake.

In the tracts which surround the alpine Tchokondo, he observed that the vegetable products and animals occupied six distinct regions or terraces, from one of which, and at a height of 8200 feet, he collected many curious species of plants and rare animals. On the Lake Torey he watched the autumnal migration of the birds, and gathered the plants of a great adjacent saline steppe. Noting the periods of hibernation and reanimation of certain quadrupeds, M. Radde has further shown that, since the journey of Pallas in 1772, the herds of that remarkable animal the *Apoceros Argoli* of Tchokondo, in Daleria, have not increased, but have been entirely destroyed by a severe winter in the mountains of Sektui and Schir, to which

they had migrated south-westwards; their skeletons now only remaining.

When the vast collection of animals and plants was gathered together and exhibited at Irkutsk, M. Selsky, who examined it, declared that, with the exception of Middendorf, Maksimovitch, and Schrenck, no traveller in Eastern Siberia had equalled M. Radde in the number and diversity of the objects collected; whilst the zoological and botanical maps which he has prepared in illustration of his researches may well be cited as proofs of his powers of generalization by enabling us to compare his data with those of Pallas, and thus measure the amount of change in the productions of nature which has taken place during the last 85 years in a region so little frequented by man, and where nature, untrammelled by artificial appliances, reigns supreme.\*

The naval officers and astronomers of the expedition directed to the river Amur, determined the principal bends of the river, and most important results for natural history science were obtained by M. Maak and the other members of the expedition. By their combined labours the maps of the course of the Amur were prepared. All the materials for the natural history of the country were collected and presented to the Imperial Geographical Society by M. Maak, and are about to be published in St. Petersburg.

Both these great Russian explorations are still in progress, and a list of all the astronomical observations, both on the Amur and in the Trans-Baikalian province, is given in the Report of the Imperial Geographical Society of 1857. This list enumerates 115 points, principally along the banks of the Amur and its great affluents. All the most important places of this great river and its general configuration are, in short, made known, and these determinations will serve as solid bases for preparing the map which is to accompany the publication of the results of the exploration of the highly interesting basin of the Amur.

M. Semenov, creditably known as the translator of the excellent work of Ritter into Russian, has been furnished by the Imperial Geographical Society with the means to explore the Russian Altai and the adjacent Kirghis deserts, already brought to the mind's eye of the British public by the paintings of Atkinson. The Russian work will thus acquire an originality of character by its copious additions.

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\* Bull. de la Soc. Imp. des Naturalistes de Moscou, 1857. No. 1, p. 296.

No scientific traveller (as M. Lamansky writes to me) had previously visited the Thian Chan and Alatau beyond the river Ili. Hence M. Semenoff, following the advice of Humboldt, with whom he corresponded on the importance of explorations in Central Asia, decided to try to penetrate into the Thian Chan and to the southern shores of the Lake Issi-kul. His enterprise was crowned by success. He penetrated without difficulty to the mountains Santache, between the Karkara (affluent of the river Ili) and the Tiub, which falls into the Lake Issi-kul. Thence he continued his way among the armed and turbulent tribes of Kirghis of Little Bukhara, then at war with the Chinese government, and pursued his travels to the East in the valleys of Djirgalan and of the Terek; this last forming the southern shore of the Lake Issi-kul. Before he reached the middle of that lake, the traveller turned abruptly to the south and advanced between the masses of rocky mountains of the Thian Chan through the transversal valley of Zaoukinsk. There, he found those alpine lakes, which, covered with ice even at the end of June, form the exterior or north-eastern limit of the fluvial system of the Syr-Daria. In another excursion to the south-east, from the Santache mountains, M. Semenoff penetrated through the lofty pass of Kosh-Djar, and reached the springs of Sarydjaz, whence flows the principal branch of the Oxus.

Other labours of the Imperial Geographical Society have consisted in the publication of the general as well as detailed topographical maps of the government of Tver. The pecuniary resources of the Society seem, however, to be insufficient for the publication of maps of other provinces which are already prepared.

The two last volumes of the Society's *Memoirs* (vols. xi. and xii.) contain the very valuable memoirs of Heltersen and Pacht, who have shown the intimate connexion between geological phenomena and physical geography in their explorations of Central Russia from the mouths of the Western Dwina to the Samara, accompanied by new geological maps.

Let me here say that the Imperial Geographical Society has also taken an interest in the expedition to the Caspian Sea, conducted by the distinguished naturalist and geographer Baer, who has published some instructive articles on the fisheries in this sea. Another memoir of Baer explains his views respecting the desiccation of the vastly larger Caspian of former periods. But sound as are all the natural history descriptions of my eminent associate, few geologists, I apprehend, will agree with him that the waters of the

great tract which Humboldt termed "Aralo-Caspian" once stood at the high levels of much of the steppe limestone, which is filled with Caspian shells; but will rather agree with myself and associates, that the great areas of land which surround the present Caspian, and which now separate that sea from the Aral, have been elevated into their present position from a former great interior depression on the earth's surface.

Lastly I may mention a fact, brought to my notice by Professor Katchenofsky of the University of Kharkoff, and now in London, that each University in Russia contributes more or less to geographical science. For example, the professors of natural history undertake every year the explorations of the adjacent districts, and publish their accounts and memoirs. Again, in the University of Kiev there was established some years ago a permanent commission for the description of Western Russia: its publications now form many volumes, and contain the most important materials for the geography, geology, statistics, and history of the governments of Kiev, and the adjacent provinces of ancient Poland.

*Germany—Austria.*—The Imperial Geographical Society of Vienna is steadily pursuing its useful career in bringing together information from other countries, and in stimulating and encouraging detailed researches which open out a knowledge of the interior of the empire or its coasts.

M. Haidinger has furnished me with good news respecting the successful voyage of the *Novara*, and has also sent to me the copy of a letter from Lieut. Maury to Dr. Seherzer, of that Austrian frigate, which contains so much of real interest to physical geographers, by throwing light on the currents and temperature of the sea, with good suggestions for nautical and physical inquiries, that I hope it will be published in the Proceedings of our Society.

The maps published and the geodetical operations executed in the last year by the Imperial Geographical Institute of Austria, under the direction of General A. von Fligely, are as follows:—Special Map of Bohemia, scale  $\frac{1}{144000}$ , sheets 2 and 14; Maps of various districts of Hungary, without the relief of the ground, scale  $\frac{1}{288000}$ ; Map of the environs of Gloggnitz, including the railroad over the Semmering, the Schneeberg, and the Rax-Alpe, scale  $\frac{1}{432000}$ ; a general Map of Hungary in  $16\frac{1}{2}$  sheets, scale  $\frac{1}{288000}$ , of which 4 sheets are published; whilst a general map of Wallachia is preparing in 6 sheets on the same scale.

In carrying out the triangulation of the Tyrol from Innspruck to the frontiers of Bavaria and to the territory of Salzburg, the engineers have determined the attraction exerted on the plummet by some of the mountains. In relation to one point in the middle of the valley of the Inn, and in approaching 530 Vienna toises towards the northern range of mountains, the deviation of the plumb line was 5".7. In the opposite direction, or in nearing the more southern mountains, or the mass of the Tyrol, it was found that for the spaces traversed of 625 and 1333 toises, the corresponding deviations were 6".2 and 10" respectively.

The Austrian Navy have recently made extensive magnetical observations in the Mediterranean, some of the most important of which are due to Dr. Schaub, the Director of the Naval Observatory of Trieste, who has lately visited London.

Of other Austrian publications relating to our subject, the most important are a book on the general Geography of the Empire, by Dr. Schmidt and Professor Wachsmuth; Von Czörnig's comprehensive work on Austrian Ethnography, with a beautiful large map in 4 sheets; and Professor Franz Potter's work on Dalmatia, the most complete relating to that country which has yet appeared.

*Other German Researches and Publications.*—During the last vacation, when roaming through Germany, I did not fail to visit the well organized and thriving geographical establishment of Justus Perthes, of Gotha, and was much gratified in witnessing the ability with which it is conducted. I am indeed glad to inform you that the 'Mittheilungen,' of which I spoke so favourably last year, has now, as I am informed, a sale of 5000 copies per month—a fact highly creditable to the German public. Having long lamented that we are not sufficiently acquainted with researches relating to Germany, or works published by writers of that country respecting other lands, I requested Mr. Petermann, the intelligent editor of that useful periodical, to furnish me with some data, which I now lay before you.\*

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\* Mr. Petermann has sent me most of the sheets of a Memoir about to appear in the 'Mittheilungen' on the Progress of the great National Maps and Topographical Labours of all European Countries, a highly useful work of reference. See also List of the "Principal Maps of Europe" in our own Map-room.

Among the works of general interest which have recently been published by Justus Perthes and Co., of Gotha, or are ready for publication, are the following (exclusive of the German edition of Dr. Barth's Travels):—Lieut. Van de Velde's large Map of Palestine, in 8 sheets, based on his surveys in 1851 and 1852, and other accessible materials. Along with this map is a comprehensive Memoir, with numerous tables of astronomical and hypsometrical observations, distances, and other data. In connexion with this map, Van de Velle and Dr. Titus Tobler have drawn a large Plan of Jerusalem, also accompanied by

During the past year several laborious investigations have been made to fix the exact altitude above the level of the sea of some central points of Germany, to serve as bases for a mass of hypsometrical data accumulated during many years, and also to set at rest the question of the levels of the Adriatic and Baltic seas. For example, Professor Bohm, director of the Observatory at Prague, has determined the altitude of that place above the Baltic at 99·37 toises, and above the Adriatic at 97·03 toises; the second part, however, of his investigation, namely, that referring to the level of the Adriatic Sea, remaining uncertain, whilst J. F. Julius Schmidt has fixed the height of the Observatory of Olmütz at 109·81 toises.

The Essay of Dr. Meyn on the Friederichs-Koog, an extensive piece of ground in Holstein, gained from the sea, is a notable addition to the history of the Coasts of the North Sea; and the most important works on Southern Europe are those of Professor W. Vischer on Greece in the year 1853, and of Professor J. Roth on Mount Vesuvius.

Of German travellers in Asiatic countries, Dr. Roth, to whom I alluded last year, must be specially mentioned; for his researches will throw much light on countries spoken of in the Sacred writings. One of the best results is his exploration of the Wadi Akabá, the waterparting or culminating point of which, between the Dead Sea and Red Sea, is ascertained to be at the salt-marsh Godiyán, about seven hours' travelling from Akabá, which is said to be 113 English feet above the level of the Red Sea. Dr. Roth has also made interesting discoveries in natural history, and has noticed that the crocodile lives in the rivers Zerka and Diffeh (32° 35' N. lat.), a fact unobserved by former travellers. At present he is exploring the countries east of the Jordan.

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a Memoir; both maps and memoirs being prepared and published in English, in consideration of the interest England takes in these countries, and also of the benefit accruing to their works from English researches. Another work, by F. H. von Kittlitz, 'Reminiscences (Denkwürdigkeiten) of a Voyage to Russian America, Kamtschatka, and Islands in the Pacific,' contains many observations on the zoology and physical geography of these regions. J. G. Mayr's Atlas of the Alps, containing the whole of Switzerland, is now published. This atlas comprises 9 sheets, and extends over all the chain of the Alps and its flanks, the author himself having, during many years, travelled over all this region. Another work relating to the Alps, by Professor Simony, of Vienna, represents in a series of landscape-pictures, highly finished and printed in colours, characteristic geological views of Alpine scenery. A Geological Atlas of Austria, by Franz Foetterle, in Vienna, is far advanced, and will soon be published. A Plan of Prague, and a Map of the surrounding Country, both by Professor Körsika, of Prague, are elaborately drawn and coloured on a system of contour lines, and are accompanied by a Memoir. A work on Earthquakes, in three vols., by Dr. Otto Volger, particularly on the Earthquakes of Switzerland, is nearly ready; whilst the Exploration of the Taurus, in Asia Minor, with Map and large Diagram of the Geographical Distribution of the Vegetation, is published by Kolsky, the botanist, who accompanied Russegger in his well-known travels.



Dr. Sandreezki has published an interesting work in three volumes of his journey to Mosul and Urumiyah; and H. Zollinger, many years resident in the East Indian Islands, has recently returned there and recommenced his labours, which formerly were mostly published in Logan's *Journal of the Indian Archipelago*.

Theodor von Heuglin's little work on a journey to Abyssinia, lately published at Gotha, and now in my possession, contains new matter on the western part of Abyssinia not visited by any other European. This author is the Austrian Consul in Khartum, and one of the most active and indefatigable travellers in Eastern Africa. A perusal of this work, so creditable to the enterprising traveller, particularly for the light which he throws on the zoology and botany of North-Eastern Africa, must be singularly gratifying to our countrymen; since the author describes and figures a very remarkable species of *Musa* of great size, with violet or purple coloured midribs of the leaves, which proves to be precisely the wonderful plant the *Ensete*, described by the great Abyssinian traveller Bruce.\* This reproduction before the public of Europe of another of the many original observations of Bruce—observations which to the disgrace of our country were formerly to a great extent discredited—has, I am happy to say, received a still more complete confirmation whilst I write, by the growth of this very *Musa Ensete* to the height of 40 feet in the Royal Botanic Garden of Kew, by my friend Sir W. Hooker, who reared it from the seed sent to him by Mr. Walter Plowden, H.B.M. Consul at Massowah, Abyssinia, in 1853.

Mr. Petermann published last year in the '*Mittheilungen*' a portion of the Diary of the extraordinary Hungarian traveller Ladislaus Magyar, of whom I spoke in the year 1853, and who has been residing for several years in Bihé, being married to a native princess. He has recently sent home a portion of his work and a detailed map of Benguela, intending to return to Europe in the course of this year and superintend the publication of this work, which is to appear in three volumes, with detailed maps.

A young savant, Albrecht Roscher, devoting himself to African studies, has produced a work on Ptolemy's '*Geography of Africa*, in which he has attempted to show the correlation between the map of that geographer and the maps determined by the most

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\* Vol. vii. (8vo. ed., 1805), Appendix, p. 140, and Atlas, Pl. VIII. and IX. M. Heuglin makes no allusion to Bruce's description of the '*Ensete*.' (See Hooker's *Journal of Botany*, No. XC., p. 210; also note on Abyssinia in the sequel.)

recent researches and discoveries. The principle of Mr. Roscher's interpretation is said to be novel and convincing.

Mr. A. Zurbold, of Leipzig, has brought out a Biography of the lamented Australian traveller, Dr. Leichhardt, and also collected and edited many detached papers and letters of that explorer.

Professor Heller, who has been travelling for several years in Central America and Mexico, has published accounts of the province of Tabasco, and of the region of Orizaba, with map. He makes the heights of the Pic of Orizaba 16,602 Fr. feet, and of the mountain Popocatepetl 16,650 Fr. feet above the sea. Professor Burmeister of Halle, so well known to geologists by his work on fossil crustaceans, &c., who previously travelled in the Brazils, has during the last year been exploring Uruguay, the Pampas, and other portions of South America. A work in two volumes by Julius Fröbel contains a description of his travels and experiences in North and Central America during the years 1849—1856. Though not professing to be a scientific work, it contains, I am assured, much new and interesting matter. Two well illustrated quarto volumes relating to the United States of North America, by Balduin von Möllhausen, have been published. This author, with Lieut. Whipple and Jules Marcou the well-known Swiss geologist, was employed in surveys and explorations connected with the projected railroads to the Pacific. The chief interest of this work, however, consists in its ethnography. An useful work on Chile has been published in French by V. Perez-Rosales, the Chilean Consul at Hamburg.

*Cosmos*.—Lastly, in mentioning the recently published works of German authors, let me dwell somewhat more on the 1st part of the 4th volume of the '*Cosmos*' of the truly illustrious Humboldt.

On this occasion the author quits the consideration of the heavens, so luminously expounded in his former volumes, and treats exclusively of telluric phenomena. The part recently issued consists of two main divisions, in the first of which he considers the magnitude, figure, density, and internal heat of the earth, as well as of its magnetism. He then pursues his grand fundamental plan; and maintaining the connecting links which unite all telluric phenomena and the representation of the concurrent action of forces in a single system, he devotes the second division to those terrestrial phenomena which are attributable to the reaction going forward from the interior upon the exterior of the planet, or, in other parlance, "volcanicity." This great class of physical agencies is most skillfully elaborated under the respective heads of earthquakes, thermal

springs, springs of vapour and gas (salses, mud volcanos, naphtha flames), and volcanos. The last are described under various heads, in each of which the direct connexion between the *modus operandi* (whether in geological and pre-historic times, or in the present period) and the geographical outlines of the earth is admirably sustained, both from the vast range of personal observation of the author, and from the citation of all those who have studied such phenomena. Although it is impossible to do more on this occasion than stimulate my hearers to read this most instructive volume, of which an excellent translation (with lucid annotations) has been produced by our associate General Sabine, I may specially call your attention to the sketch of the geographical distribution of volcanos. Humboldt estimates that out of 407 volcanos, 225 have been in activity in very modern times; and of these, 198, or  $\frac{7}{8}$ ths of the whole, lie within the great "Pacific Basin." One of the important generalizations which he is disposed to draw, from a consideration of their prevalent linear direction, is, that islands and coasts are richer in these outbursts, because, to use his own words, "The upheaval effected by internal elastic forces is accompanied by adjacent depression in the bed of the sea, so that an area of elevation borders on an area of depression, the limit between them exhibiting profound clefts and fissures."

After minutely examining the chemical and mineralogical characters of the rocks produced by volcanic action, and doing all justice to the new classification of volcanic rocks by M. Gustaf Rose, Humboldt concludes this volume by pointing out the importance and extent of the eruptions of molten matter through the great clefts or fissures above spoken of. "He has been led (he says) to entertain the conjecture that a not inconsiderable portion—perhaps, according to volume, the larger portion—of volcanic rocks have been emitted, not from elevated volcanic frameworks, but from a net-work of fissures, on the earth's surface, from which they have poured forth, often forming strata covering an extent of many square leagues."—(English Edition, Sabine, p. 448.)

In a conversation which I held with my venerable friend in Potsdam in September last, just as he was entering his 88th year, he explained to me some of these views with his accustomed clearness and freshness of description; and I then had the satisfaction to find, that in addition to the remarkable volume now issued, a second part would soon follow, in which all organic nature, from its earliest traces in sedimentary strata to the present day, will be exhibited in

harmonious correlation with the physical changes of the crust of our planet.

*Switzerland.*—To our praiseworthy correspondent, M. Ziegler of Winterthur, so well known for many beautiful maps of his native country, I am indebted for what we know of the progress of Geography in Switzerland. The geodetic and topographic surveys have been continued in the mountains on the north of the Canton of Tessin, and along that part of the chain of the Alps which includes the Cols of Lukmanier, the Little St. Bernard, and the Splügen. Detailed works have been executed in the environs of these passes, whilst triangulation is proceeding on the elevated points above Dissentis and the valley of the Vorder-Rhein.

The principal travels which have been executed during the past summer, were undertaken chiefly with a view to geological researches. Those of Dr. Heusser in the Valais were made in the vicinity of Visp—to observe the centre of a disturbance caused by alarming earthquakes, which have not yet entirely ceased. M. Heusser, being a Professor attached to the University of Zürich, has recorded his own remarks on the localities of those phenomena in a pamphlet\* published by the Society of Natural History of Zürich. Chanoine Rion has also given an account of earthquakes experienced in 1855, from June to November.†

During the past winter meteorological observations were likewise made throughout all the extent of the central Alps; repeated luminous appearances having astonished the observers.

By reason of the uninterrupted advance of the works for railways in Switzerland, the number of exact hypsometric data is continually on the increase, and M. Ziegler will continue his communications relating to altitudes along these lines, and will also make us acquainted with the progress of each railway. The Polytechnic School publishes a journal‡ which may be called the scientific organ of that federal institute, and which will describe in detail every Swiss railroad.

Hypsometric charts have been multiplied; and as their utility augments in proportion as we become enabled to compare with accuracy the heights of different countries, M. Ziegler has transmitted to us an extract from a work which he is preparing for speedy

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\* Das Erdbeben im Visperthal im Jahr 1855.

† Sion, 1855.

‡ Schweizerische Polytechnische Zeitschrift, 4to., Winterthur, 1856, pp. 12.

publication, and which will be noticed hereafter in our own publications.\*

*France.*—Through the Report of the ‘Bulletin de la Société de Géographie’ of Paris by M. Alfred Maury, one of the Secretaries of that Society, we learn that the 20th part of the Map of France by the “Etat-Major,” on the scale of  $\frac{1}{86400}$ , has been issued. The Dépôt de la Guerre has also completed a reduction of it in 16 sheets, and on the scale of  $\frac{1}{328000}$ .

The Survey of Algiers is in progress, on scales varying from  $\frac{1}{300000}$  to  $\frac{1}{800000}$ .

Availing themselves of their leisure hours at Rome, the French officers have completed a Map of the South-Eastern part of the Papal Dominions on the scale of  $\frac{1}{80000}$ , to which has been adjoined a Plan of Rome and its environs on the scale of  $\frac{1}{20000}$ .

In the neighbourhood of the French possessions in Africa, the officers of the Etat-Major have compiled a Map of the Regency of Tunis, founded upon the observations of M. Falbe; and another, with the assistance of Capt. Baudouin, of the Empire of Morocco.

M. Linant, so well known by his earlier exploits, has produced a hydrographic chart of Egypt, and a map of Etbaye, the country inhabited by the Biehari Arabs.

In addition to the mention of the labours of the Dépôt de la Marine in the last year's Address, we have to thank that office for numerous charts since presented to us, whilst MM. Delamarche and Ploix have completed a line of soundings between Port Vendres in France and Algiers. The late M. Vincendon-Dumoulin, in company with the distinguished surveyor Capt. de Kerhallet, has published a work entitled ‘Etudes sur le Détroit de Gibraltar;’ and in the second edition of the ‘Etudes sur les Ports de l'Algérie,’ lately published, a series of excellent charts has been presented, the execution of which does credit to M. A. Licussou. Lieutenant A. Boucarut has prepared the nautical documents for the Manual of the Navigation of the River Plata; and Capt. A. Legras has published an excellent work, entitled ‘Description des Iles et des Passages compris entre la partie N. de l'Ile de Luçon et les Iles du Japon.’ The work of our own Ilorsburgh on the Indian Seas, already rendered into French by Admiral le Predour, has received considerable additions from MM. Darondeau and Reille. From Captain Cloué we have a notice of the Sea of Azov, of which our associate

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\* Atlas hypsométrique, avec des éclaircissements.

Capt. Sherard Osborn gave us a description. In addition to the above, Capt. T. de Lapelin has made known his late surveys on the Pacific side of Central America.

On the west coast of Africa, France has taken possession of the territory of Dakar, opposite to Gorée; whilst Capt. Guillaïn has completed his work on the voyage of the *Duconédic* to the east coasts of the same continent in 1846-7 and 8,—the portion relating to Guiledi, Zanzibar, Meurka, Mombás, and the languages of the tribes on the coast, being of particular interest.

*Italy.*—Little has been done for the advancement of geography in any one of the Italian States to the S. of Sardinia and the Austrian territory.

The trigonometrical survey of the kingdom of Naples for example, commenced under the late General Viseonti, has progressed slowly of late years; the number of officers now employed upon it not exceeding twelve, who are occupied in laying down the frontier line with the Roman States. Of the great map of the kingdom, on a scale of  $\frac{1}{880000}$ , the three first sheets, including Gaeta and the neighbouring provinces, are on the point of being published. They are beautifully engraved, having the principal heights marked. The whole survey of the kingdom, and on the same scale, will consist of 68 sheets. The Topographical department is also now engaged in bringing out a general map of the kingdom, on a scale of  $\frac{1}{640000}$ , in four sheets. Commander Marzolla, of the same department, has of late years published a series of maps of the different provinces, chiefly derived from Zannoni's map, but with the roads more accurately laid down, and rectifications from the later military surveys of each province have been inserted, with detailed statistical data regarding the population, productions, &c. Although indifferently lithographed, these maps will be found to be useful for the traveller, until the great trigonometrical map is completed.

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## AMERICA.

*Arctic Regions.*—A paper by the Danish author Dr. Henry Rink has been read before our Society, commenting upon parts of the volume of the lamented Kane. One of the chief points on which he dissents from the opinions expressed in the work of the memorable American explorer is, that the Humboldt Glacier of the latter is not to be considered as the embouchure of the great fluvial icy system

which covers Greenland, but simply as being analogous to the other glaciers of that country, which he, Dr. Rink, had long studied, and on which he has written;—viz., separated masses, which, advancing from E. to W., launch or “calve” their bergs into a succession of fiords.\*

The other subject on which the Danish observer is a critical opponent, is the northern extension of the map of Kane as derived from the rapid excursion of the ship-steward Morton. As this last point underwent an animated discussion, in which Sir G. Back, Captain Collinson, and Dr. Armstrong took part, I refer you to our forthcoming Proceedings for the conclusions at which they had arrived respecting the necessity of removing Washington Land some miles to the south, and will now only remark that not a word was said upon the occasion which could in any degree affect the noble and chivalrous character of Dr. Kane.†

Of the expedition sent out by Lady Franklin I have little to add to my last notice of its departure and arrival at Disco, nor is it probable that any other communication will be received until October. We have, however, the satisfaction of thinking that, under the experienced guidance of McClintock, our friends are at the present moment exploring that hitherto untouched land between Bellot Strait and the Arctic Magnetic Pole, whence they will follow up the steps of our missing countrymen; and though there are some who will not admit the existence of Peel Strait, and more who doubt the possibility of navigating it, there are yet to be found others who, considering how simply the bugbear of rounding Point Barrow has been dissi-

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\* See Journal Royal Geographical Society, vol. xliii. p. 145.—ED.

† After these lines were penned, I received a copy of the ‘New York Times’ of May 6. in which it was announced that Dr. Hayes, the companion of Kane, had laid before the Scientific Association of New York a project for a voyage of exploration to the North Pole by proceeding beyond the limit of Kane’s researches. This bold project is founded on the observations of Dr. Kane and the author, who noted that the growth of the plants, as well as the stature of the natives of their farthest north, together with the great northward migration of birds, were indications of a gradual decrease of cold towards the Pole. Hence it is inferred, that the broad zone of greatest cold, or that of 78° N., being once traversed by a plan indicated, the party would reach an open Polar sea, and a probable temperature of 66°. If the revival of the question of a Polynia should be followed up by an expedition sent out on such scientific grounds, we must truly thank our Transatlantic kinsmen for such a labour of geographical love.

Referring to the discussion which took place when Dr. Ruk’s memoir was read, let me here say that I have had great pleasure, whilst this Address was going through the press, in finding that Professor Bache had come to very nearly the same conclusion as Sir G. Back, Captain Collinson, and Mr. Arrowsmith. This result being communicated to the Society at our last meeting of this session, together with friendly explanations, must have convinced Mr. Poor, the representative of the Geographical Society of New York, who was present, that nothing had transpired on the part of our countrymen, in relation to the voyage of Kane, which exceeded the bounds of fair inquiry among men who were seeking out the truth.—*June 25.*

pated, are not without good hope, that to the glory of establishing the fate of our missing countrymen, will be added that of the circumnavigation of America. At all events we may rest assured, that with the certain prospect of a secure retreat in the event of reaching the American Continent, Captain M'Clintock will strive to the utmost to get southwards in his vessel; so that with an experienced commander, a well-found ship, and an able crew, whose energies are directed to a known point, we may, under Providence, look forward to a successful result. Still it is not without reason that we are desirous to open a communication with him, and a fine opportunity is afforded to any enterprising person, like the noble author of 'Letters from High Latitudes.' Wager River or Chesterfield Inlet might readily be reached this season by such a vessel as the *Foam*, and the intervening tract of land between the gulfs and the estuary of the Great Fish River crossed in time to secure a retreat before the winter. Here would be the excitement of danger so frequently courted, together with the certainty of sport both for the rod and gun, and the prospect of aiding in the elucidation of that great mystery which has occupied the attention of the civilised world for so long a period!

I cannot quit the theme of Arctic researches, upon which I have long thought with intense anxiety, and on which I have dwelt so much at length at former Anniversaries, without expressing my obligations to our associate Mr. John Brown for his work entitled 'The North-West Passage and the Search after Sir John Franklin,' which he has dedicated to the Royal Geographical Society and myself. In this volume the philanthropic author—at all times in the front rank of those who have sustained the search after our missing countrymen, and who has never given way to despondency—has placed before the reader an able epitome of all the efforts which have been made, as well as the theories which have been formed on this engrossing topic. On his own part, he adheres to the simple view, that the gallant Admiral has been encompassed and held fast by adhering literally to his instructions, and by seeking to force his way in a south-westerly direction from Beechey Island. Not re-entering into this vexed question, which it is hoped M'Clintock may set at rest, and on which so many experienced Arctic authorities have written, some of them believing that, if such was his ultimate fate, Franklin first essayed to force his way northwards and reach an open Polar sea, we must admire the warm-hearted earnestness with which Mr. Brown has



acquitted himself of his task, and has placed before us in a compact form the services of so many of our Arctic heroes.

*North America.—British Possessions.*—In the Address of last year I entered somewhat into the details of the expedition which, under Palliser and his associates Blakiston and Hector, upon the recommendation of the Council, had been despatched by Government to survey the water parting between the basins of the Missouri and Saskatchewan rivers, and to explore the edges of the Rocky Mountains within our own territories. Since then we have received, through the courtesy of the Colonial Office, several communications conveying the information that Capt. Palliser reached San Josef, an American town seven miles from the British frontier. The bend of the Pembina river near that place is within the American territory; but it has been carefully surveyed, as a large portion of the river flows through British ground. After visiting Turtle Ridge, the expedition reached Fort Ellice, at some distance from which, coal of fair quality was found, and afterwards reached the Qui Appelle Lake, on which is situated the most western station of the Hudson Bay Company's traders. Thence, the explorers started for the Saskatchewan, and in the course of their journey were for the first time compelled to carry fuel with them. The river was found to be navigable for large boats from the point reached,  $109^{\circ}$  longitude, to Red River. From Fort Carlton, his winter quarters, Captain Palliser proceeded to Fort Pelly, and subsequently to Chicago, Detroit, and Montreal. The paper notices the different Indian tribes met with, the character of the country, the swarms of buffaloes, and the wholesale and indiscriminate slaughter of them by the Indians, and describes the resources of the country, and its adaptability for agricultural purposes. Guides and a party of men had been engaged to assist in the projected operations, and in the summer Captain Palliser intended to start for the south branch of the Saskatchewan, through the country of the Black-foot Indians. From Lieut. Blakiston the Secretary has heard that he had completed and sent the map of the route to Captain Palliser for transmission to the Colonial Office.

The magnetic observations of Lieut. Blakiston and the geological researches of Dr. Hector, from whom I have received very satisfactory reports, will doubtless prove valuable, and may be alluded to with more effect at our next Anniversary.

On that occasion also I trust it may be in my power to report good progress on the part of the survey which, under the command of our Associate Lieut.-Col. Hawkins, has proceeded to co-operate

with the American surveyors and soldiers in defining accurately, and if possible by marked physical features, the boundary between the British possessions and those of the United States lying to the west of the tracts explored by Captain Palliser, and terminating in the Pacific to the south of Frazer River and Vancouver Island.

As this last survey is accompanied by a clever young geologist, M. Bauermann, brought up under my direction, and who is specially versed in mineralogy, I look with great interest to his report of the structure of these hitherto slightly-explored regions, the mountains of which, whether the Cascade range near the coast or the great Rocky Mountains farther in the interior, are simply the prolongations of the two chief chains of the western waterpartings of New Mexico, California, &c.

The natural obstacles to the progress of such a party were, it was well known, the dense forests they must penetrate; and to these I learn, whilst I write, is added the discovery, which might also have been well anticipated in the prolongation of the Californian ridges, of so much gold in the banks of the Frazer river \* as already to have caused numerous emigrants to rush to these new diggings; a course which I fear the working men of the American and British surveying parties may be too much disposed to follow.

*Canada.—Report of its Geological Survey.*—The Geological Survey of Canada, under the direction of Sir William Logan, has issued elaborate Reports, in two volumes, for the years 1853-4-5 and 1856, copies of which have been presented to the Society. A great part of these Reports is necessarily taken up with geological subjects. The first by Sir William Logan gives an account of a large part of the Laurentian formation, which runs from the coast of Labrador to Lake Superior, forming along a large part of its course an important mountain chain, chiefly formed of gneissic rocks, equivalent to the oldest gneiss of the north-west of Scotland and of the Scandinavian chain. Among these rocks, between Lake Huron and the River Saguenay, there are many bands of crystalline limestone. The gneiss proper yields but an indifferent soil, while that derived from the limestones is exceedingly fruitful; the result being that in the gneissic district almost all the farms have been established on sinuous lines of limestone, which, now partly cleared, often penetrate far into the interior of the forest-covered Laurentian chain.

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\* See the Californian newspapers, &c.

The exploration of fresh countries like large tracts of Canada, or the new territories of the United States, offers continual illustrations of the dependence of geology on geography; for the geologist is often obliged to map the ground topographically while conducting his own labours. Canadian rivers and lakes previously unknown have been thus laid down with precision, and many merely indicated before have been reduced on a series of maps which occupy 22 large plates, filling a quarto volume. These surveys were conducted by Mr. Alexander Murray, and embrace a vast tract of country between the north and east shores of Lake Huron and the river Ottawa. This territory is traversed by the river Myanatawan, which runs westward through a chain of small lakes, and empties itself into Georgian Bay, Lake Huron. Again the Muskoka river passes in a winding course of about 150 miles through a series of lakes to Burnt Island Lake, about half way between Lake Huron and the Ottawa. Near this point the Petewahweh rises, and flows north and east, emptying itself into the Ottawa at Upper Allumette Lake. On the north shore of Lake Huron large rivers of the same character are now for the first time accurately mapped, called respectively Spanish River, White Fish River, and Wahnapiatae River, which unites the lake of the latter name with French River, about ten miles from one of its mouths. This French River is of great geographical importance, uniting as it does by several channels the north shore of Georgian Bay of Lake Huron with Lake Nipissing, which is about 50 miles long by 20 in breadth. The eastern shore of Lake Nipissing is only a few miles distant from Upper Trout Lake, which, through the Mattawa river, communicates with the Ottawa in latitude  $46^{\circ} 18' 12''$ . It is in contemplation by the Canadian Government, if practicable, to construct a ship canal through these rivers and Lake Nipissing, so as to unite the Ottawa and Lake Huron. This would shorten the distance from the east to Chicago by 600 miles.

In the year 1856, on the same survey, an exploration of the island of Anticosti, in the Gulf of St. Lawrence, was made by Mr. J. Richardson. This island is about 140 miles long by 35 in breadth, and consists partly of Lower Silurian rocks, but chiefly of a series of limestones called the Anticosti group by Sir William Logan, containing as they do a suite of fossils somewhat peculiar and intermediate in character between those most characteristic of the Lower and Upper Silurian rocks, like those of the British strata to which I have assigned the term Llandovery rocks. Mr. Richardson walked

round the island, which is quite uninhabited, except at the light-houses. The coast is intersected by numerous streams, and a great part of it has a belt of reefs dry at low water, the outer edge of which forms a cliff from 25 to 50 feet high, that evidently constituted an old coast line when the land stood relatively to the sea at a higher level than at present. The south side of the island is generally low, but on the north it rises in a succession of ridge-like elevations to a height of from 200 to 500 feet above the sea. The country is covered with wood, chiefly spruce, varying from 8 to 18 inches in diameter, and from 40 to 80 feet in length. Besides this, it is reputed to bear "pines," poplars, mountain ash, cranberries, a species of gooseberry-bush, red and black currants, strawberries, species of peas, &c. Potatoes have been cultivated successfully on the south side of the island, also Timothy grass and clover, and Mr. Richardson observes that he saw half an acre of barley 4 feet high with a strong straw and well-filled ear. The wild animals in the island are black bears, the red, black, and silver fox, and the marten.

Canada may, indeed, well be proud of this survey, the great explorations conducted under the direction of Sir William Logan having added almost as much to our knowledge of the topographical and natural history characteristics of the country as of its geological structure.

*Central America.*—Reserving for our next Anniversary an account of the progress of geographical knowledge in the United States, let me now call your attention to a commercial enterprise which seems to afford a valuable opportunity for the extension of our acquaintance with a region hitherto imperfectly known. Of few portions of the world within the bounds of civilization is our knowledge perhaps more circumscribed than of Central America. It is stated by a recent traveller (W. V. Wells, 'Explorations and Adventures in Honduras') that even as respects the leading towns the true position of but few is given with any accuracy. A Company composed of influential persons, at the head of whom is that liberal merchant prince Mr. W. Brown, M.P. (who munificently bestowed a great free public library and school upon the town of Liverpool), is about to construct a railway across Honduras, to establish a commercial passage between the Atlantic and Pacific Oceans. For the last twelve months this Company has had a numerous staff of engineers upon the ground. Struck with the importance of the project (for the direct distance is only 160 miles,

and the railroad it is estimated will not have a greater length than 180 miles), Her Majesty's Government have sent out Colonel Stanton, an officer of the Royal Engineers, to inspect the survey, which is now completed. A chemical geologist and naturalist (Mr. Kirkpatrick) is also proceeding to Honduras to explore the mineral wealth and physical geography of the country, and the productions and quality of its soil. There will, therefore, not long remain any doubt respecting the capabilities of Honduras. Already we know from the work of Mr. E. G. Squier, that its harbours on both oceans, and its natural valley from sea to sea, intersecting the Cordilleras by the courses of the rivers Humaya and Goaseoran, point out this tract as a great highway of commerce. In anticipation of the good results which are likely to follow from this effort of British capitalists and the suggestions of Mr. Squier, let me add that, out of near 60 persons hitherto employed during a year in a tract which has been considered insalubrious, not one death has occurred.

Through our active associate, Mr. John Power, of Panamá, we have received notices of various works in progress bearing upon the geography of these important but still very imperfectly mapped countries.

Dr. Wagener, the German traveller, was by the last accounts at Panamá, proposing to devote some time to an examination of the geography of the isthmus.

Of Guatemala an entirely new map is preparing for publication by Mr. Van Gehuchte, a civil engineer, who has spent eight years on a trigonometrical survey of this state, in which he has determined by astronomical observation the true position of all the principal towns, as well as of the leading physical features of the country. Our correspondent, Mr. Power, has sent us a portion of the positions so determined, which will appear in the next volume of our Journal. To him we are also indebted for the translation of the first part of 'A Description of the State of San Salvador,' by Mr. Sommenster, an engineer who has been employed in making a new survey of it for the Government, which will shortly be published. Costa Rica has been partially surveyed by an English Company from Port Arenas, on the Pacific, to San José, the capital, a portion of the isthmus said to be now very incorrectly laid down.

Mr. F. M. Kelley, of New York, well known as the originator of the proposed great ship-canal across the Isthmus of Central America *via* the Atrato river, has sent to us the interesting report

of Lieut. N. Michler, in charge of the topographical party sent by the United States Government to survey that part of the country. Lieut. Michler announces to the Navy Department, that he has completed his topographical survey across the Isthmus from the Gulf of Darien to the Pacific, along the line for the interoceanic canal proposed by Mr. Kelley. The practicability of the route, says Lieut. Michler, can only be determined upon after the necessary examination of the results of those labours.

*South America.*—On the river Meta, an important tributary of the Orinoco, steam vessels have been established by a Venezuelan company, whereby an opening has been made into the very heart of the country for the outlet of the products of the interior provinces of New Granada.

A new map of the State of Equador has been completed, after many years' labour and study, by Dr. Villavicencio, a native, who proposes carrying it to Paris himself for publication.

In Chile an exploratory expedition has crossed the Andes into the Indian territory south of Valdivia, to examine the lake of Nahuelhuapi, the site of an old settlement of the Jesuits, supposed to be the source of the great Rio Negro, which crosses the continent, and falls into the South Atlantic in latitude 41°; the details of which are promised to be sent to us.

The long pending dispute between Brazil and Paraguay relative to the opening of the upper waters of the river Paraguay has been recently settled by an amicable arrangement throwing open the navigation, in virtue of which the products of the rich province of Matto Grosso may now for the first time be exported by water-carriage, and we may look perhaps for some new data regarding a vast region very little known to Europeans.\*

## ASIA.

*Syria.*—Pushing onward to the east and south in the Pashalik of Damascus, beyond the explorations of Seetzen, Burckhardt, Lindsay, Porter, &c., our Associate Mr. Cyril Graham has, through the good will of that singular people the Druses, contrived to visit the very remarkable tracts to the east and south of the Haurán,

\* The reader who may wish to obtain more knowledge on the subject of the various parts of America than I here allude to must also consult the works thereon by German authors.—*See ante*, p. clxix.

called es-Safáh, el-Hárrah, and the whole eastern borders of the Jebel ed Druz. He has given us, in short, a most animated sketch of a region which, occupied successively in olden times by powerful and civilized races, is now a desert, over which wandering and predatory Arabs, almost alone, hold sway. The es-Safáh is a highly-broken basaltic district, which extends to the N.N.W. into a chain above 30 miles in length, not marked on any map. The el-Hárrah, on the contrary, is a broad lower zone of loose basaltic fragments, forming the western belt of the broad rich plain lying between the Haurán mountains and the river Euphrates. After a description of the physical geography of this long forgotten region, the author describes the position of numerous cities scattered over the desert to the east and south of the Haurán, which, though wholly uninhabited, and for the most part roofless, are in many respects as perfect as when the olden people lived in them! Agreeing with Porter, that the Haurán must be the ancient Bashan of Scripture, Mr. Cyril Graham believes that the towns lying to the east of it, and which he discovered, are of a still older date, and were probably the work of the first Hamite emigrants from Shinar. He also collected very curious inscriptions in an unknown character, which have not yet been deciphered.

In reviewing the adventurous and successful travels of Mr. Graham, of which we shall soon have a detailed account in our Journal, we painfully recognise the fact, that a once highly cultivated, richly wooded, and densely peopled country, which after the times of Holy Writ was successively occupied by Greeks, Romans, Christians, and Saracens, has been reduced to a desert, supporting only a few nomadic tribes of Arabs.

The desiccation of the country may in great part be attributed to the destruction of once stately groves of lofty trees, which attracted the clouds and moisture, as well as to the demolition of those great reservoirs of water which the ancients constructed; but we are forced to the conclusion, that the main cause of this wide-spread sterility is the misrule of ages, and the inability of the Turkish Government to protect any industrious and settled inhabitants from the incursions of lawless Arabs. In the mean time it is refreshing to know from Mr. Graham, that the persevering Druses, to whom he was so much indebted (and who now supply the indolent inhabitants of Damascus with nearly all their corn), are extending agriculture, with muskets over their ploughs, into the richest spots of this *terra incognita*, and are thus explaining to us how such land may in

ancient times have fed and supported the people who dwelt in the vast number of deserted cities.

*India—Himalaya, Karakorum, and Kuen Luen chains.*—*Résumé of British Labours in India.*—At our last Anniversary one of our Gold Medals was justly bestowed upon Colonel Waugh for surveying and laying down on maps a vast area of the Peninsula of India, and for determining that the Himalayan range, the loftiest mountains in the world, reached their culminating point in Mount Everest at the height of 29,002 feet, considerably to the west of the point hitherto supposed to be their summit. On the same occasion I spoke to you of the recent travels of the three brothers Schlagintweit, particularly in Upper India, and the mountains to the north of it.

Unhappily there is too much reason to believe, according to native report, that Adolphe Schlagintweit, who was left exploring in the countries beyond Ladak, and far to the north in the direction of Yarkand, and from whom no letters have been received for more than a year, has fallen in an action with the Chinese, in their war against the people of Turkistan; the fruits of his enterprise being, it is feared, lost. As, however, the reports of the natives proved unreliable in the case of our excellent explorer Moorcroft, let us hope that Adolphe Schlagintweit may still be spared to bring home to us some knowledge of the Yarkand territory.

The other brothers, Hermann and Robert, have now deposited at the India House their manuscript observations, numbering 43 large volumes, accompanied by maps indicating the distribution of their 88 magnetic stations, numerous meteorological observations, including all those which they obtained from various officers of the Company, and the localities where their plants were collected.

A considerable portion of their collection has indeed been already set up in the Museum of the India House, including transverse sections of trees, and facial casts of the people among whom they travelled, which, being taken from the living person of races little known, must be of value in ethnographical science.

Geographers must desire to see the results of these labours published, not only as relates to terrestrial physics and magnetism, but specially by the production of a map, on which shall be laid down the northernmost of those explorations of which, on the authority of Humboldt, I spoke last year, and to which I now revert: for it is indeed unquestionable, that the Schlagintweits did proceed farther to the north and by east, in the meridian of Ladak, than any other European traveller.



As a resultant of the numerous surveys and travels of our countrymen who have explored northwards from Hindostan, I may remind you that the gigantic peaks which enclose the lofty plateau of Tibet, and separate India from Turkistan, have generally been considered by British geographers to constitute one vast mass, or sea of mountains.\* They were indeed so spoken of when I had the honour of delivering our Gold Medal to Henry Strachey, one of the best surveyors of large parts of this rugged region. Concentrated upon the west, in a knot or group, at and around the Hindu Kush, these mountains expand thence to the east and south in fan shape, their southern portion, the Himalaya, being the loftiest elevations in the world, and forming the northern boundary of India. Farther to the north, and beyond the plateau of Tibet, comes another band of parallel altitudes, which, also proceeding south-eastwards from the lofty western knot, is known near that meridian as the Múztagh, and acquires, a little farther to the east, the synonym of Karakorum. This last range, which, still farther to the east, is the Kailas of British topographers (adopted from the Hindú mythology), has for some years been marked on maps as the watershed of the mountain region which separates the drainage of India from that of Turkistan and China.† It throws off to the south the Indus, Sutlej, and Brahmaputra; the two first, after wandering westwards, and the last eastwards, in the plateau of Tibet, escape southwards through gorges of the mighty Himálaya, whilst to the north it sends off minor streams, the western ones of which, from whatever authority derived, have been for some years laid down on maps as descending from these mountains into the north-western low country of Yarkand.‡

In alluding to this axis or waterparting, it is a fact that it has not been traversed by any European proceeding northwards from India, though I specially invited your attention to that adventurous journey of Dr. Thomson when he ascended to the summit of the Karakorum

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\* See P. C. . . . . Tibet; Journ. R. Geograph. Soc., vol. xxiii: p. 1.

† Call. . . . . mountains in St. Martin's map, accompanying  
Julien's ? !!

‡ See Map accompanying Hügel's 'Travels in Kashmir,' prepared by Walker (small general part thereof), and Arrowsmith's General Map of Asia, 1841; also the Map accompanying the Travels of Moorcroft and Trebeck, published 1841—some of the materials for the northward drainage from the Karakorum having been doubtless those collected by Mir Izzet Ullah, the remarkable servant and *avant-courier* of Moorcroft, whose travels beyond the Himálaya, through Tibet to Yarkand, and thence by Samarcand to Bokhara, &c., were translated from the Hindu by Professor H. Wilson in the Calcutta Oriental Quarterly Magazine of 1825, and republished by the Royal Asiatic Society.

pass. The same chain was, however, passed over in *its far eastern* prolongation by those very remarkable missionaries Huc and Gabet, though, unfortunately, they have given us no materials by which we can define its orographical features.

Now, the feat of the brothers Schlagintweit, of which I partially spoke last year, was, that leaving the Karakorum to the south, they traversed a diversified and broken plateau of about 16,500 feet average above the sea, and of about 100 miles in breadth from south to north, when, reaching a depression extending from west to east, they found between it and the low country of Khoten, another parallel east and west range, one of the heights of which they determined to be from 19,000 to 20,000 feet above the sea.\* According to these travellers, this is the Kuen Luen (a Chinese name) of Klaproth and Humboldt, and is so called by the natives. Leaving these mountains, and descending to Elchi or Ilchi, the Khotan of Marco Polo, in the lower country of Turkistan, they were unable to reach Yarkand, and then returned to Ladak by another route, or that which leads from the former to the latter place. The rivers which they mention as separately flowing northwards, and which they have personally examined, are those of Khoten, Karakash, Yurungkash, and Keria, two of which were engraved in Arrowsmith's map of Asia (1841), from a large Chinese map at the India House, brought home by Colonel Reeve.

I here, however, repeat what I stated last year; viz., that the Schlagintweits are the only geographers who have visited those localities. They sustain, in fact, the view of Humboldt, and affirm that his Kuen Luen presents all the characters, relations, and altitude of an independent chain, as laid down by that great geographer in his '*Asie Centrale*.'†

In anticipation, then, of the publication of such maps as their very arduous and difficult journey enabled them to make (they being disguised as natives), let us willingly accord to these brothers (one of whom has, I fear, paid the penalty of his life for adventuring too far into those wild tracts) the merit of having penetrated so far northwards as Khoten. Let me add that their drawings and paintings—particularly those of some of the great glaciers—are most striking and effective.

In alluding, however, last year to other labours of these gentle-

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\* Mir Izzet Ullah makes the distance from the north face of the Karakorum to Yarkand between 120 and 130 hours of march, which he accomplished in a caravan in seventeen days.

† See Humboldt's '*Asie Centrale*,' 3 vols. and Map 1843.

men, I much regret to have attributed to them geographical results in the Kumaon territory which were mainly accomplished, more than thirty years ago, by the very able British officers of the Trigonometrical Survey of India; viz. Captains Webb, Hodgson, and Herbert.\*

In that survey, those officers measured the altitudes of such a number of peaks averaging upwards of 20,000 feet, that references were made to them by numbers instead of by printed names, among which the No. 14, which is the Nundi-Devi of my last year's Address, was separately measured by Hodgson and Webb, the former placing it at 25,749, the latter at 25,669 feet—a striking proof of the concurrence of the independent labours of these hard-working and excellent geographers.

Again, the glaciers of the river Pindur are laid down in the same map, and Capt. R. Strachey, Col. Madden, and other British officers have carefully examined these glaciers since that time. In fact, the orography of the mountains between the Kalee and the Sutlej, including Kumaon, has long been known; though the Schlagintweits made some interesting additions to the physics and the pictorial delineation of these tracts.

Nothing could be farther from my thoughts than not to sustain the hard-won laurels of the many British subjects who have earned great scientific reputation in the Trans-Himalayan regions. Nor can any one doubt who has perused the 'Asie Centrale' of Humboldt † that he has striven to do honour to Moorcroft and Trebeck, the brothers Gerard, and all our earlier explorers; whilst in subsequent

\* See Sheet 66 of the Great Map of the Trigonometrical Survey of India, issued by Horsburgh, 1827. I have the more been called upon to correct this *erratum* in my preceding Address, and to register the antecedent labours of some of the many British geographers and engineers, in consequence of a document presented by the MM. Schlagintweit (in September last) to the East India Company, in which they specify all their intended publications, without referring to the labours of their numerous predecessors in the regions through which they travelled. This document, which was not intended for publication, unluckily found its way into a periodical, and naturally gave umbrage to those who thought that numerous observations of our countrymen were slighted. In justice, however, to MM. Schlagintweit, I must state that they have assured me of their having always intended to enumerate the labours of their predecessors, as well as to refer gratefully to all those persons who kindly aided them; and they claim to be not judged by a mere MS. announcement of *their own* researches.

† I speak only of what Europeans have done in the region under discussion; for besides what was done by Moorcroft's man, Mir Izzet Ullah (see p. clxxxiv), Major Cunningham has shown, in the Asiatic Journal of Bengal, that as early as the year A.D. 414 the Chinese traveller Fahra explored some of these mountainous regions; and in his translation of Hiuen-Tsang's Travels in India during the seventh century. M. Julien also mentions the knowledge which the Chinese had acquired of this country.

works, including those with which I have myself been connected, such as the volumes of the Geological and Geographical Societies, there has surely been no remissness in acknowledging the highly-important and original labours of several of these remarkable men.

For a humbler part in bearing testimony to the deserts of my countrymen, I refer you to several of my Anniversary Addresses, but particularly to that of 1852, when, after presenting the Gold Medal to Henry Strachey for his arduous services in completing a map of Western Tibet, I specially spoke of the successful explorations by my countrymen of "that part of Asia to which, as Englishmen, we attach deep interest, as constituting the northern frontier of our Indian possessions, which geographers revere as the loftiest region of the earth, and which it has been the ambition of Humboldt through life to visit in person."

We have not, indeed, to go far back in scientific history to note that one of the greatest additions to the science of physical geography was made by our countrymen Hodgson, Herbert, Colebrooke, and others, who, despite the incredulity of European philosophers of mark, demonstrated that the *Himálaya* mountains were the loftiest in the world!

In here reverting to a few only of these men, let me remind you, that whilst Henry Strachey received our Gold Medal, his brother Richard justly obtained the admiration of geologists for his clear and faithful description of so large a range of the region on both sides of the *Himálaya*, including the territory of Kumaon. Most assuredly I never could be oblivious of the services of the man who had been the first to demonstrate the existence of Silurian rocks near the *Himálayan* axis! \* I further endeavoured to bring to your mind's eye the researches, in regions never before visited by European naturalists, of Joseph Hooker in Eastern Tibet, and of Thomson in Western Tibet, † researches so well conducted in many branches of natural history, and particularly of botany, as to have won for them the admiration of all enlightened men.

Again, did not geologists and geographers, with whom I have been acting, long ago recognise with gratitude the real merits of our Indian explorers, Cautley and Falconer, when they put forth their remarkable description of the wondrous fossils of the *Sewalik* hills?—researches all the more striking and praiseworthy, since the authors not only defined a new range of elevations as

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\* *Quart. Journ. Geol. Soc.*, vol. vii. p. 292, and vol. x. p. 249.

† *Royal Geog. Soc.*, vol. xxii., President's Address.

perfectly separated from the Himálayan chain, but, when far distant from all the means and appliances of Europe, actually described forms of extinct vertebrata never before brought to light, and assigned to them their true places in the animal kingdom.

In mentioning the name of Falconer, I cannot but regret that a large portion of the researches of my valued friend have never been laid before the public. Thus, I have ascertained that in 1838 he crossed the mountains of Iskardo, and followed up one of the sources of the Indus by the valley of the river Braldo to about  $36^{\circ}$  N. latitude, on to the glaciers which hang upon the southern face of the Muztagh or Karakorum, afterwards explored by Thomson, and which there separate the great steppes of Tartary, and the affluents of the Oxus, from the drainage of the Indus. Assisting in measuring a base line in Cashmir, in company with the late Colonel Mackeson, he amassed a large collection of plants from the Muztagh range, Western Tibet, and Cashmir, Lower Affghanistan, the Salt Range, and the Punjab, which valuable accumulations are at length being examined at Kew, under the direction of Sir William Hooker and his son.

Such researches as these, and many unregistered data, deserve to be accurately chronicled among the feats of our exploring countrymen in India, as well as the labours of Jacquemont, Hügel, Vigne, Winterbottom, and others, which have been noticed in our Journal, and are well known to geographical readers.

But here let me observe, that the writer who would bring together the numerous observations of all observers and travellers in various parts of India, which are scattered through a variety of periodicals, would render immense service to science. Many of these labours, as far as they relate to botany, geography, and geology, including those of my lamented friend the adventurous Burnes, have been frequently brought under your notice, whilst those of the distinguished botanist Royle have been feelingly adverted to by my contemporaries in mourning over the recent death of that eminent man.

In relation to geology, some of us are well aware that much light has been successively thrown upon the sister science by the labours of a host of observers, besides those I have alluded to, in various parts of Hindostan, among whom the names of Sykes, Franklin, Malcolmson, Christie, Newbold, Vicary, Fleming, Carter, Buist, &c., are honourably enrolled.

Let me also add, that I entertain a most sanguine hope that, with the re-establishment of order, the geological survey of India

will, under the direction of Professor Oldham, be brought into a condition of great usefulness to the empire, whilst under his able guidance it cannot fail to evolve results of great interest to pure geological science, some of which are indeed already foreshadowed in materials forwarded by him, which are now under consideration in this country. Although it is not my province to dilate on geological subjects, it gives me real pleasure to state that, as Governor-General of India, Lord Canning has taken a warm interest in the promotion of geological science, both by the enlargement of the Geological Survey formed during the Government of Lord Dalhousie, and by the addition of a School of Mines, thus testifying his sense of the necessity of opening out effectively the mineral resources of the Indian empire.

*China.*—The political arrangements which are pending will, it is hoped, result in the opening out of this vast empire, and in obtaining for us a much better acquaintance with the geography of its interior than we now possess. It is possible, though not probable (considering the suspicious character of the Manchu, or reigning dynasty), that the negotiations of our Government may result in the residence of a British minister at Peking, and, if so, a field for geographical investigation will be opened in Northern China, a region hitherto little visited by any Europeans except the Russians, and in early times by the Jesuits. But if this effort should not be successful, the mere laying open to the enterprise of our merchants, of the great river Yang-tse-kiang, which waters the vast plain, in the centre of which lies the ancient capital Nankin, will obtain for us an acquaintance with the chief interior parts of China. It will, in a word, give us access not only to the town of Hankow, perhaps the largest mart for commerce in Eastern Asia, which, situated 500 miles from the coast, is accessible to ocean steamers, but also to all the sites of mineral wealth.

The importance of this river as the high road into Central China was recently pointed out to the Society in a memoir, equally instructive and judicious, by our associate, Mr. W. Lockhart, who had resided many years in the country as a medical missionary. According to this experienced writer, and the concurrent testimony of Mr. Consul Alcock, as well as of several naval officers, most signal advantages must follow from opening out this great water-course, which would bring Europeans into immediate commercial connection with the one hundred millions of people who inhabit its fertile banks and those of its affluents.

A remarkable circumstance connected with physical geography, to which Mr. Lockhart directed our notice, and one that will doubtless attract great attention, is the change which has taken place in the course of the Hwang-ho, or Yellow River to the sea. Instead of flowing to the south of Shantung, as formerly, this mighty stream has shifted its embouchure to the north of that promontory, falling into the gulf of Pecheli, 200 miles from its former mouth! This is one of the many proofs of the decline of vigorous government in China. In earlier periods the embankments of the rivers were carefully watched and repaired; but neglect has led to the breaking down of all artificial ramparts, and vast fertile tracts have consequently been sterilized.

Although unacquainted with scientific geography, and the relations between astronomy and geography, the Chinese possess, it appears, remarkable geographical and statistical accounts of the whole empire. A work called the Ta-tsing-yih-tung-che, one of many similar publications, enters minutely into the topography, locality, and limits of every province, city, town, village, and hamlet in the empire, and gives the minutest details regarding the population, products, commerce, and characteristics of the different places described.

Of all the recent donations made to our Library, no one has more gratified me than the offering of Mr. Lockhart, of the Te-le-tseuen-che, or a compendium of elementary geographical science, in two volumes in the Chinese language, as prepared by his associate, the Rev. W. Muirhead, and published at the expense of the late Mr. L. Dent, an English merchant. Translating the works of our most popular authors, and illustrating them with maps, diagrams, and drawings of animals, our good countrymen who have already issued two volumes,—one on political, the other on physical geography,—have thus taken the best method of breaking down the barriers which have so long separated us from this peculiar but most intelligent, ingenious, and laborious race.

Had it not been for the present troubles in China, much would have been accomplished in the survey of the coasts of Tartary and Japan. For that purpose H.M.S. *Actæon*, under the command of that deeply-lamented officer the late Captain Bate, was despatched from England last year, but having been detained before Canton, the object of her voyage was postponed. Besides the knowledge of the course of the great rivers, we have yet to obtain an acquaintance with the northern coast-line to the gulf of Pecheli and Leaou Tung, as also with the whole of the coast of Corea.

The Russians, as already stated, have long had intercourse with the northern provinces of China; in fact, their overland commerce with the Chinese is of far greater antiquity than our maritime trade with this people. Russia has also had, for many years, a religious establishment at Peking, which she has enriched of late by attaching to it various men of science, whether miners, geologists, or astronomers. Of the former, Major Kovanko, of the Imperial School of Mines, long ago published an account of the coal produce of the environs of Peking. M. Constantine Skatschkof, who has resided nearly eight years at Peking, as Director of the Russian Observatory there, and who, having recently returned to Europe, has just visited London, informs me that he has also prepared an account of those rich coal fields. Though not professing to be a geologist, this accomplished gentleman, having inspected the fossils of the Museum of Practical Geology, had no hesitation in recognizing among our British types, Silurian Graptolites and Orthoceratites, with Devonian Spirifers and Carboniferous Producti, as being forms which he had seen around Peking.

As a large collection of these remains will be brought to Petersburg next year by M. Vasilefsky, the medical officer of the Russian Mission, we shall know precisely the extent to which the same fossils extended from Britain to China in the palæozoic times. Already, indeed, we may feel pretty certain that such a diffusion of similar types prevailed; for Mr. Lockhart has furnished me with fossil shells from the interior province of Sze-chuen, which are identical with species of Devonshire and the Boullonais.

Possessing these palæozoic rocks, with many ores and metals, and vast and rich coal fields, the empire of China, with its rich products of the soil, lies before us as a wondrous mine of wealth and lucrative commerce, which when opened out to Europeans may operate greater changes in our international relations than all the gold of California and Australia.

From the knowledge we have already obtained of the central and southern parts of China, it would seem pretty certain that we have attached too great an importance to the territory around Canton, which is cut off from the vast central and most populous portion of the empire, watered by the Yang-tse-kiang, by a chain of mountains at no long distance from the seaboard. Hence the rivers which flow from that ridge to the south, being short and small, are valueless as highways for commerce, when compared with the great central stream which flows from east to west for a distance of 3000 miles.



Though this is no place for political digressions, I must be forgiven if I make public a fact which has come to my knowledge from two reliable and independent sources respecting a Chinese public character, the Mandarin Yeh. Looking to the rigour and apparent wholesale cruelty of his measures, when governor of the province of Canton, the English public have been led to regard him as a monster of cruelty. I am, however, assured, by both Mr. W. Loekhart and M. Skatschkof, that Yeh simply carried out the orders of his Government, which shows no mercy to rebels;—the latter, indeed, having spared none of the Imperialists, including a number of Yeh's relations. On the other hand, my informants affirm that Yeh is an example of virtue in China; inasmuch as though he might have become very rich at the expense of the natives, who are usually oppressed by the Mandarins, he is a poor man—further, it is stated that he is a very learned person, who, owing all his advancement to his superior knowledge, has larger and more enlightened views of government than most of the leading men in China.

Chinese emigration appears indeed to increase from year to year, and, in regard to our own possessions in the Indian Islands and Australia, we can already reckon about 150,000 Chinese settlers or subjects. Again, our imports of the two Chinese commodities, viz. tea and silk, amounted, during the last year, in value to twelve millions, whilst the two articles, of tea in England and opium in China, yielded to the English and Indian exchequers a revenue of nine millions sterling.

These simple facts proclaim the vast importance of obtaining a better knowledge of an empire which contains at least one-third part of the whole human race, and whose inhabitants are more ingenious and industrious than any other Asiatic population.

*Asiatic Archipelago.*—On the subject of the great Asiatic Archipelago, three papers have been read before the Society, to which I shall presently particularly advert. It is just three centuries and a half since this large portion of the globe was first made known to the civilised world, and the larger portion of it is still to be discovered as a field for future exploration. A few words, derived from my friend Mr. J. Crawford, will convey a notion of the geographical importance of this field of discovery. The high-road of nations to the empire of China, the Hindu-Chinese countries and Japan, lies inevitably through this Archipelago. It contains four of the largest islands in the world, Borneo, Sumatra, New Guinea, and Luçon, with an united

area of 630,000 miles, or six times the extent of the British Islands. The longest volcanic band in the world runs through the whole Archipelago, to the length of at least 3000 miles. This band (containing no fewer than 45 active volcanic mountains, the lowest of which is higher than Vesuvius, while the highest exceeds Etna), is a distinct region from the non-volcanic portion, and is, by its fertility, distinguished from the crystalline and sedimentary portion.

This non-volcanic portion of the Archipelago, by far the larger, has, however, its peculiar advantages; for while the useful metals are wanting in the volcanic region, they abound in the other. This non-volcanic region contains the richest and the most extensive tin field in the world; for that ore is found, at intervals, over seventeen degrees of latitude; and while its produce is as yet confined to the washing of the alluvium containing the ores, the yield of metal is already double that of Cornwall. Iron ores of excellent quality are found in Borneo, which island also contains mines of gold, which were considered comparatively rich until the discovery of those of California and Australia. Borneo further contains the richest mines of antimony at present known to us, and although discovered only thirty years ago, they now furnish the main supply of Europe. The same island furnishes coal, a mineral far more important (if it be the old coal?) than any of the above, which is at present worked by English companies.\*

The vegetable products of the Archipelago immediately useful to man are probably more various than those of any other quarter of the globe. It produces the larger portion of the spices consumed by mankind, and its volcanic region is eminently adapted to the culture of corn and pulses, of the sugar-cane and coffee. The present yearly produce of the last article, although an exotic, is estimated not to fall short of 25,000 tons.

In the department of zoology, I will only refer to its principal member, man. The inhabitants are of two distinct races, the Negro and the Malay, and each of these is divided into many sub-varieties, speaking as many different languages as the people occupying an equal extent of America. A curious and important fact, connected with the distribution of man over the Archipelago, is especially deserving of notice. By far the most numerous, and also the most civilised portion of the inhabitants, is found in the volcanic and smaller region. The entire number of the inhabitants has been computed

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\* On the S. side, coal is also worked by the Dutch.

at twenty millions, of whom no fewer than seventeen are in the volcanic region. Java alone, abounding in volcanic rocks, contains ten millions, or one half the population of the entire Archipelago. The two little volcanic islands of Bali and Lombok, of which the united area is but 3,300 square miles, have a computed population of 1,250,000, which is probably equal to that of non-volcanic Borneo, of eighty times their extent!

On the subject of the vast country which has thus been sketched, three papers have, as already stated, been read before the Society. The first of these, in importance, is that of Mr. A. R. Wallace, on the Arru, or Aroe Islands. This singular group lies towards the eastern extremity of the Malayan portion of the Archipelago, and is but 200 miles from the south-western coast of the great island of New Guinea, a comparatively shallow channel lying between. They are low islands, for the most part covered with forest, the larger being seven in number, and divided from each other by such narrow channels, that, but for the saltness of the water, the voyager might fancy himself in an ordinary navigable river.

The inhabitants are a quasi-negro people, but now considerably intermixed with Malays, Javanese, and natives of Celebes; some converted to the Christian, some to the Mahomedan religion, but some also continuing heathens. Of all the Oriental Negroes they are the most docile and industrious; being made so by their trading intercourse with strangers. Their sterile land will yield no human food except maize and yams, and they receive their rice from the more western islands of the Archipelago. An extensive bank, on the eastern side of the group, is productive in the mother-of-pearl oyster, in an inferior kind of pearl oyster, in the tripang, or holothurion, and in the shell tortoise; and the fishing of these is the chief employment of the natives. The Aroes are an emporium to which the western traders resort for the commodities now enumerated; while the islands themselves yield most of the birds of paradise, and the various parrots which, under the Malayan names, somewhat corrupted, of Lories and Cockatoos, are esteemed by distant nations.

The similarity or identity of the plants and animals of the Aroe group, man included, with the comparative narrowness and shallowness of the sea between them and New Guinea, has induced Mr. Wallace to come to the conclusion, that these smaller islands once formed part of the continental island. This is a matter which this enterprising traveller and accomplished naturalist will be better able to reason upon when he visits New Guinea, as he proposes.

Meanwhile, I would bring to your recollection that there has been read before us, by our Associate, Mr. John Yeats, an able paper on New Guinea, being a translation from the Dutch of Dr. Müller. That scientific traveller proceeded, in the quality of naturalist, with a Dutch expedition in the year 1835, and his account of the part of the great island which he saw is by far the best which has ever been given to the public.

The third paper is that of Lieutenant de Crespigny, R.N., who proceeded to Borneo, recommended to our distinguished Medallist Sir James Brooke by our late President, Admiral Beechey. Lieutenant de Crespigny gives, in a letter to our Secretary, an intelligent account of a river and country at the extreme northern end of Borneo, probably never seen, and certainly never before described, by an European.

*Australia.*—We cannot often expect to grasp so much fresh geographical knowledge respecting this vast country of British occupation as was laid before us last year by Gregory and his associates. Still, in respect to that portion of Northern or Tropical Australia in which that expedition first disembarked, and was for some time encamped, many interesting and new details have been produced by Mr. Wilson, the geologist, who has recently returned to England. Having had charge of the camp whilst Mr. Gregory made his first movement southward and ascertained the existence of a saline interior desert, this gentleman lost no opportunity of surveying accurately certain tracts around him, by scanning the nature of the rocks, the botanical products of the soil, and also by observing the natives and lower animals which inhabit the region watered by the Victoria and its affluents. His companion Dr. Ferdinand Mueller, the botanist of the expedition, who was also stationed in the camp of which Mr. Wilson had the charge, thus writes to me from Melbourne respecting him: "I feel it my duty to bear testimony that his exertions in the general duties of the expedition, whilst commanding at the main camp, were praiseworthy in the highest degree." \*

After laying down the topography on maps, accompanied by pencil sketches, which give us a fair conception of the horizontal ridges of sandstone and trap rock with occasional limestone, the author estimates that there are tracts of not less than five millions of acres in extent, which, being covered by the richest grasses and

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\* I may also record the testimony of Mr. Humpherey, a volunteer attached to the expedition, in favour of Mr. Wilson.

well watered, are specially fitted for pasture, and therefore suitable for the permanent settlement of a civilized community. He also points out that no other part of Australia possesses so many navigable rivers as the northern seabord, the Victoria having been ascended by the schooner *Tom Tough* to 100 miles above its mouth. Though necessarily hot, the climate is by no means injurious to European life, as proved by the fact that, although living there for nine months, the party did not lose a man, and scarcely any sickness prevailed. The thermometric tables kept from November to July indicate a range from  $47^{\circ}$  as a minimum to  $106^{\circ}$  as a maximum, with 84 days of rain. The grasses are described as so luxuriant as to grow from 6 to 10 or 12 feet in height; large timber is scarce, though smaller and other trees bearing fruit are not rare. Rice was found indigenous in one spot by Dr. Mueller, and in another by Mr. Wilson, who ascertained that it was eaten by the natives. Fish are plentiful, but kangaroos are scarce. Not now advertising further to the descriptions of various other animals, including the curious walking fish, and noting that the dingo or native dog is larger than in other parts of Australia, I revert with satisfaction to the ascertained healthiness of the country as well as to the fruitfulness of the soil to support the suggestion which I made many years ago, and again brought to your notice at the last Anniversary—that, whether by the establishment of a penal settlement or a free colony, North Australia ought unquestionably to be occupied without further delay.

On my own part I adhere to the opinion that, craving as we do any site to which we may transport felons (why not rebellious Sepoys?), there is no region on the globe which combines more advantages, with the gain of a high political object, than the north coast of Australia with its bays and streams. The convicts who might be first planted there, as I have previously shown, will be so completely cut off from all other parts of the seabord of Australia which are occupied or can be occupied for a long time to come, as to prevent the escape of criminals. Now, as few persons will deny that it is of great importance that our maritime power in the Indian Archipelago should be sustained by having a port on the coast of North Australia as a refuge for our ships, and as a “point d'appui” for naval operations in case of war, so I trust that after colonizing the other sides of this continent, England will no longer abstain from unfurling her flag on its northern shores, whether by forced or free labour.

The reader who is interested in tracing the progress of discovery

in Australia will find a clear and well condensed historical review \* of the same by Dr. Ferdinand Mueller, to whom I have already alluded, and to whose valuable labours due reference was made at our last Anniversary. Excluding from this summary all that relates to maritime survey, the author enumerates the explorers of the interior in the last 40 years, and indicates the amount of discovery made successively by Evans, Oxley, Allan Cunningham, Hume and Hovell, Sturt, Mitchell, Henty, Grey and Lushington, Strzelecki, Clark, Wickham and Stokes, Eyre, Leichhardt, and Kennedy. Dr. Mueller renders his article doubly valuable by giving in Mr. Gregory's own words a description of the physical geography of Western Australia, in which country that geographer was so long a resident. He further sketches with the pen of one well acquainted with the country the outline of his late journey from Tropical or Northern Australia, and brings together the various notices of recent journeys in South Australia, by Hack, Babbage, and certain settlers, and concludes that any rivers which would afford the means of penetrating far inland can nowhere be expected to exist (setting aside the mighty Murray and its tributaries), unless they be found between the FitzRoy River of North-West Australia and Shark Bay, a region where we have no settlement, and the coast of which has not yet been surveyed.

Colonel Gawler has also printed a little summary of geographical discoveries during 1857, to the west and north of Eyria in South Australia, to strengthen what he considers to be the evidence that the "country to the west of Lake Torrens is the true and practicable line of communication for rail and common road and electric telegraph between the south-eastern provinces of Australia, the great interior, Stokes's Victoria river, and the north-western coast in general." However incredulous I still am, as to the discovery of any considerable extent of really valuable country in the region to the north of Lake Torrens, or in finding habitable and rich oases in the great central portion of the continent, towards which the country seems to lower and become saline, and notwithstanding that I think Colonel Gawler's views too sanguine, it would ill become the President of this Society to damp the ardour of those researches by which alone the question can be permanently settled.

Mr. Hack has already laid open a band of country fitted for pasture, and furnished with supplies of water, which lies between the great saline tract of the seaboard explored by Eyre, and the

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\* Read before the *Institute* of Melbourne, 25th Nov., 1857.

equally saline region on the north as made known to us by Sturt. Now, although this belt may possibly serve as a line of traffic between South and West Australia, it yet remains to be proved if, by surmounting the natural obstacles and want of water on the north, experienced by Sturt, it be practicable to reach beyond the saline desert in that direction, or find in the centre of Australia, any oases of good land supplied with natural springs. Mr. Herschel Babbage, who had distinguished himself by a former survey in South Australia, is now determining the question. This gentleman has recently explained to the Philosophical Society of Adelaide the detailed manner in which he hoped to carry out his survey; and I am happy to say that his project is devised with the mathematical precision and accuracy of delineation, whether as regards the instruments he was to use, or the methods by which he hoped to overcome the obstacles opposed to him, which are well worthy of the son of our eminent mechanical philosopher.

When we reflect upon the arduous task to be accomplished, and the incessant labour of extracting fresh water from salt throughout so vast a breadth of saline country as the party must traverse to reach any portion of the expected land of promise, we cannot too much admire the devotion and skilful appliances with which such difficulties are to be overcome. A cheering vista has indeed been suggested in the reports that cattle have migrated from the north, where they must have pastured: but whether this should prove to be well founded or not, whether the colonists may be gratified by the discovery of a rich interior, which we must all heartily wish for, or depressed by ascertaining the positive continuation of a saline desert northwards, geographical science must gain curious additions by this arduous enterprise.

*Gold produce of Victoria.*—As fourteen years have elapsed since I first addressed you on the rocks of Australia, which were destined to prove auriferous, and as I have in subsequent years, including our last Anniversary, adverted to the produce of gold, it may be expected that I should say a few more words on the subject, particularly in relation to the highly productive colony of Victoria. Mr. Selwyn, a distinguished élève of the Geological Survey of Britain, and Professor McCoy, the well-known palæontologist, have now completely set the geological features of the case at rest, and have demonstrated that the principal auriferous quartz veins (or those from which all the productive gold shingle or gravel has been derived) occur in slaty rocks of Lower Silurian age, as proved by

their imbedded organic remains. These veinstones (the reefs of the miner), which are rarely more than a foot or two in width, have here and there yielded a good deal of gold near the surface, and hence numerous shafts have been imprudently sunk deep into them. Many of the operators have already found to their cost that these sinkings are profitless, either by the diminution of the ore or by the expense and difficulty of extracting it. In truth, the result, as far as the present trials go, seems to justify my former inferences as based upon the experience gained in other gold bearing countries. The report of the mining companies of Victoria is to the effect that already ten of the shafts which had been sunk into the solid rock had been abandoned, and that enough had been already done to vindicate the old scientific inference, that in a general sense (though there are exceptional cases) deep mining for gold in quartz rock is profitless.

Very different, however, is the produce derivable from the auriferous débris. For, although many of the old diggings have, as I anticipated, also been exhausted, or the materials which filled the natural troughs and depressions worked out, Mr. Selwyn points to considerable tracts of country over which such auriferous débris will yet be found to extend, whilst he regrets that he is unable to define the probable range and limits of such detritus from the want of any accurate geographical maps. In reference to all the yet unexplored tracts through which it is believed the gold detritus may extend, the geological surveyor naturally calls for the same sort of detailed map as that which represents the gold bearing region near Mount Alexander as trigonometrically surveyed by Mr. W. S. Urquhart, and brought out by Mr. Arrowsmith on the scale of 3 inches to 2 miles.

Referring you to what I said last year respecting the time which may possibly elapse before all the gold shall cease to be profitably extracted from the rich heaps which are more bountifully spread out in Victoria Land than in any known part of the world, I repeat my conviction that, whether in a quarter of a century or more, the period will soon be roughly and approximately estimated (*i.e.* so soon as the geologist is furnished with good maps) when the exhaustion of the *great* produce of Victoria shall take place. Whether the existing causes of the decline in produce, including a deficiency of water for the works, be or be not of a temporary nature, it is a matter of fact that the amount of the past year has been below the average of the preceding years.



## AFRICA.

*Livingstone, or Zambesi Expedition.*—As few events have reflected greater credit on the British nation than their warm and affectionate reception of the good and noble minded Livingstone when he emerged after so many struggles from the heart of Southern Africa, so it is most gratifying to every friend and admirer of that excellent man to know that the produce of his pen as a record of those travels has had so great a sale as to ensure a competency for his wife and children. The 30,000 or 40,000 copies of his remarkable volume, which the public eagerly bought, constitute the real monument which the author has raised for himself!

When I lately presided at the great festival held to wish him and his associates God speed, and dilated upon their prospect of success, I endeavoured at the same time to moderate the over sanguine expectations of the mercantile portion of the public in reference to the trade which might speedily be opened out with these regions.\*

It is also well to bear in mind that there are difficulties to be surmounted even in the ascent of the Zambesi, of which persons unacquainted with the oscillatory nature of African rivers must be informed. Thus, Mr. Macqueen, our sagacious critic on all South African subjects, writes to me, that when the celebrated Portuguese traveller Lacerda † ascended the Zambesi in 1798, and when it was in full flood, he found that for spaces of 9 or 10 miles the stream had a depth of 3 feet 4 inches only; the current being so rapid that he was obliged to unload his small boats and transport his baggage by land. We must, therefore, be prepared to hear of similar obstacles to navigation in Livingstone's case; but let us hope that they are now in the very act of being overcome by the forethought and enterprise of a leader in whom we have every confidence, supported as he is by a naval officer, Commander Bedingfeld, of great experience in the navigation of African rivers, and heartily sustained by associates, each of whom is thoroughly adapted to effect the special object of his mission,‡ whilst all of them are sincerely attached to their undaunted and sagacious chief.

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\* See Proceedings, vol. ii., p. 116.

† Lacerda's Journals of the Expedition to Cazembe were published at Lisbon in the 'Annaes Maritimos' for 1844, and are in our Library.

‡ The other officers in addition to Commander Bedingfeld are Mr. C. Livingstone, secretary and superintendent; Dr. J. Kirk, surgeon and naturalist; Mr. R. Thornton, mining geologist; and Mr. T. Baines, artist and storekeeper.

*Niger Expedition.*—In reference to the Niger, or Quorra, I have been further reminded by Mr. Macqueen that both Clapperton and Lander have left behind records that the river for some distance both below and above Boussa, if not unnavigable, owing to rocks and rapids, is probably useless as a highway for any trading purpose. In the days, however, of those explorers, steam had not been applied in the ascent of African rivers; and although too great a confidence in that power may have led to the dilemma by which the *Day Spring* was wrecked, we have the satisfaction of knowing that, although the party lost their papers and collections, and saved barely provisions and articles of barter enough to support themselves, and possibly to effect the main object of the expedition, still it was supposed that the persevering and able commander, Dr. Baikie, might succeed in establishing an intercourse with the Sultan of Sokato. At the same time the arrival of another steamer, the *Sunbeam*, which has been so speedily equipped by Mr. Macgregor Laird, will soon restore the confidence in our resources with which it is sought to impress the native chiefs.

We must, however, bear in mind that attempts to navigate unsurveyed tropical (African) rivers must be attended with danger, owing to the great oscillations in their depths between the periods of high flood and those of the dry season.

In thus briefly alluding to the Niger Expedition, of which I still hope to announce good results at our next Anniversary, it is gratifying to know that one favourable circumstance has already arisen out of their effort, in the establishment, by our Associate, Mr. May, of a direct and undisturbed line of transit between Boussa and our great establishment of Lagos, on the coast, which promises to be of high importance in securing our intercourse with Central Africa.

*Congo, &c.*—The Congo was ascended in the beginning of last year by Commanders Hunt and Moeresby, R.N., who, after great exertion in tracking their boats against the powerful current, were finally brought to a standstill by what they consider to have been the cataracts of Yallila, four days above Embona.

The river was broad and uninteresting for the first 70 miles, as far as Embona; but immediately beyond that place the nature of the country it flowed through underwent a complete change, and high hills, diversified scenery, and luxuriant vegetation began to appear. The current increased in rapidity, until at the farthest point reached by the party the Congo poured its whole stream between two promontories only 250 yards apart, roaring and rushing with fearful

violence, and forming immense breakers and dangerous whirlpools, such as no vessel could possibly live through. Commander Moresby considers that a steamer of light draught would have no difficulty in ascending up to this point, which must, I suggest, prove to be of high interest to the geological explorer, who will probably meet near the cataracts of Yallila with the same hard and crystalline axis of the country as occurs in a more northern parallel at Boussa, on the Niger or Quorra.

A short journey has been made by Dr. Bastian in the province of Congo, preparatory, it is believed, to a future and a more extended exploration. Many valuable facts relating to the tribes of the interior are said to have been collected by him.

On consulting with our African Medallist and one of our Hon. Secretaries, Mr. Francis Galton, I find his opinion to be that there is no direction in which an explorer could travel by which he might add more to our knowledge of Africa than by starting from one of the seaboard towns of its south-west coast, such as Loando, and journeying thence in a north-easterly direction as far as circumstances would permit, and as near as possible to the eastern countries now being explored by Captains Burton and Speke. Every step in such an expedition would, I admit, be a distinct gain, and serve in a remarkable manner to lay bare the vast remaining tracts of the terra incognita of Africa.

*Central Africa.*—The preceding observations, and those which I offered to you at the last Anniversary in reference to the great difficulties which Dr. Barth had surmounted, naturally lead me to speak of the two concluding volumes of the work of this great African traveller, which are just issuing to the public. These volumes narrate his proceedings subsequent to the death of Dr. Overweg, on the borders of Lake Chad, and include the most interesting part of his entire journey and his sojourn at Timbuctu. In addition to his 'Travels,' Dr. Barth has delivered lectures before the British Association (at Dublin) on the Hydrography of the Niger, before the Asiatic Society on the Ethnology of the Berber (Tuarick) race, and at the last meeting of this Society he gave us an epitome of the physical and social geography of Northern Africa, in the construction of which he made ample use of the labours of African geographers, in a sound knowledge of whose works there are few who rival him.

It will be obvious, from the nature of Dr. Barth's investigations, that it is perfectly impossible for me to condense his results into a

few paragraphs. The main physical features of the land he travelled in, and the principal geographical discoveries of himself and his coadjutors, are already known to us; and are incorporated into the popular geography of the day; as, for example, the desert plateaux with their Alpine oases, the upper course of the Chadda-Benue, and the vast lagoons and floods of these central equatorial regions. For the rest, we are furnished with such a multiplicity of independent details, that broad, general views, calculated to convey a correct, though cursory knowledge of his labours in Northern Africa, can with difficulty be embraced on this occasion. He deals with ten or twelve distinct races, each unlike the rest in features, customs, and languages. We have to consider them as distributed into about as many nations, but in such a manner that the boundaries of their territories by no means coincide with the boundaries of the races; and, in addition to this entanglement, we find large settlements or colonies of Fellatahs and of Tuaricks dispersed about the country, bearing relations of a most diverse and anomalous character, both to the government of the land they inhabit, and to that whence they migrated.

The physical features of North Africa are equally various: a fertile band lies adjacent to the Mediterranean; then comes a desert, studded with oases; and, lastly, by a more or less gradual transition southwards, the scene is utterly changed, and an excessive drought and barrenness give place to the very opposite extreme of humidity and equatorial vegetation. Where, then, the kingdoms do not correspond with the races, and neither of them with the physical features of the soil; where the state of society is in a constant flux of warfare and change, leaving few records of its transitions (and those of the most meagre description, dating back some to the times of the Roman empire, and others to the 10th, 12th, and 14th centuries), it is easy to conceive that a geographer like Barth, whose line of inquiry is eminently historical and social, and who is remarkable for the patient accumulative industry of his countrymen the Germans, should have gathered a mass of matter which his voluminous publications appear insufficient to exhaust, and to which it is totally beyond my power to do justice in this Address. I am, however, convinced that there is no method of epitomising his labours so convenient as that of displaying them upon large maps, variously shaded and tinted, to show the races, nations, population, physical features of the country, and so forth; such as those that were submitted by him at our last evening meeting. Those maps

and his accompanying memoir will, I trust, be hereafter published in the Society's 'Journal,' and it must be to them, rather than to any description of my own, even when aided as I have been by the study of Mr. Galton, that I beg to refer all those readers who desire to learn the nature and the extent of our gains in African geography due to the indefatigable industry of our medallist, Dr. Barth.

*Cape of Good Hope.*—A careful survey of the lower course of the Orange River has been made by our Associate, Mr. Moffat, the son of the well-known missionary, and the brother-in-law of Dr. Livingstone, under circumstances of difficulty, owing to the exceedingly desolate nature of the country through which that river runs. His paper is of interest, not only as an accession to the descriptive geography of an almost unknown region, or as delineating the northern boundary of our colony, but also as throwing light on the general physical geography and geology of that part of Southern Africa.

*Ovampo.*—The country of the Ovampo, first reached by Messrs. Galton and Andersson, has again been visited by a party whose expedition ended disastrously. Two of the missionaries of Damara Land, accompanied by Mr. Green and a party of 30 Damaras, had hoped to cross Ovampo Land and to reach the river Cunene. The king of the Ovampo offered them hospitality, but on their arrival, for some unexplained cause, he peremptorily refused them passage, and when they had made ready to return, the population rose en masse, attacked them, and killed one of their attendants. After half a day's defence, in which many of the Ovampo were killed, the party had the good fortune to escape unharmed into the wilderness, and after three days and two nights of forced marches reached a watering-place, and thence made their way back to Damara Land. The route of the travellers was parallel to that of Mr. Galton, and many geographical features were discovered, including a small lake, but the detailed account of their observations has not yet reached us.

Mr. Andersson, the Swedish explorer, to whom we gave one of our honours in 1854, has announced his intention of himself travelling to the Cunene River, and he probably started on his expedition from Walfisch Bay in the beginning of this year. Although he describes himself as very inadequately equipped, we must hope that his long familiarity with South African travel will compensate for other deficiencies.

*Senegambia.*—The districts adjoining the Senegal are becoming far better known to Europe than they have been hitherto. The French at St. Louis, dissatisfied with their position of dependence upon the

capricious good will of the native chiefs, have made vigorous efforts to secure to themselves an open navigation of the river, respect to their flag, and cession of land for settlements along its course. Much information has been gained in consequence of their exertions; and interesting communications upon Senegambia appear frequently in the '*Revue Coloniale*,' a monthly periodical, to which I would direct the attention of those who follow with interest the progress of civilisation in Western Africa, or who may desire to inform themselves upon French colonial interests in general.

*Mozambique.*—In turning to the east coast of Africa, let me say that Mr. M'Leod, our newly-appointed consul at the Portuguese settlement of Mozambique, is proving himself to be of great service both to his country and to the cause of science. In a letter, dated December 14th, he informs me that he had called the attention of our Government to the great advantages of establishing a steam-postal communication between Aden and the Cape of Good Hope, showing how much time would be saved thereby in comparison with the present line. This subject would have been brought under your consideration, had I not reason to believe that the expenses already incurred in establishing and maintaining the present line of communication are considered too great, on the part of the Treasury, to permit a new large outlay.

Again, in the suppression of illicit measures for carrying on the slave-trade, under the name of *Free Emigration*, but which is frequently a mere guise for a real trade in slaves, Mr. Lyons M'Leod, who is exerting himself with energy, gives great praise to the present Portuguese Governor-General of Mozambique, who, despite one-sided judges and the old habits of the colonists, is determined to carry out the sentiments conveyed to the British public, at the Farewell Dinner to Livingstone, by Count Lavradio, the enlightened representative of the King of Portugal, in relation to the extinction of that detestable traffic.

Mr. M'Leod has also communicated to me a rough Portuguese chart, or rather two plans, of the river Zambesi, which, if it had arrived somewhat sooner, might have been really serviceable to Livingstone and his associates. Major Sicard, the Governor of Tete, had promised Mr. M'Leod further information respecting the Zambesi, and also plans of that part of the country where the coal-mines are situated, with a description of the launches now used in conveying the mineral to Tete, the mode of obtaining it, &c. From the same source, our active Consul was also gathering information con-

cerning the medicinal plants of the banks of the Zambesi. He has further written to the Chamber of Commerce of Manchester, informing them that the cotton shrub grows close to his house on the mainland, opposite Mozambique, and that he has already stimulated some of the influential residents to clear a considerable space of ground for its cultivation. As the climate and soil are peculiarly favourable to the culture of the cotton plant, he requests that seeds of the three well-known varieties should be sent to him, in which case he proposes to send the "Nankin" and "Green seed" varieties up the Zambesi, and far into the interior, and to reserve the "sea-island cotton" for culture on the coast; the sandy soil being better adapted for this variety, the growth of which would be favoured by the saline breezes of Mozambique.

In pursuing researches like these, and in thus preparing the way for the great improvement of South-Eastern Africa, which the mission of Livingstone is to carry further out, it is refreshing to find our Consul so zealously and cordially aided by the Governor-General of Mozambique, not only in all objects tending to the suppression of the slave-trade, the improvement of commerce, and the increase of material prosperity, but also in many scientific researches. Among these may be numbered a series of observations on the currents of the Mozambique Channel, for the determination of which the Consul has prepared a thousand copies of a printed circular, with explanations in four languages, which he delivers to captains of vessels sailing to the Mauritius, Port Natal, the Cape, Zanzibar, Johanna, and Bombay, whilst the Port Captain furnishes him with extracts of the logs of the vessels arriving—so collecting materials for wind and current charts, on the plan of Lieut. Maury. When I add that Mr. Lyons M'Leod is keeping a meteorological register on the mainland, whilst the Governor-General keeps one on the island of Mozambique, and that he has steadily made magnetic observations, you will all agree with me that our Associate is a person well qualified, by his energy and capacity, to extend the benefits of commerce, science, and civilisation on the East Coast of Africa.

I am not indeed without hopes that the range of the usefulness of this active Consul may be extended along the East Coast; and that, seeing the importance of establishing regular communication and intercourse between Natal on the south, and the rich Somauli provinces of the Imaum of Muscat on the north, our merchants may drive an extensive and lucrative trade, a considerable part of which,

let us hope, will be furnished from the Zambesi, and out of territories now about to be explored by Livingstone and his comrades.

*Expedition from Zanzibar and Mombas into Eastern Africa.*—Captain Burton and his colleague, Captain Speke, have now fairly set to work upon their great expedition into Eastern Africa. When they first arrived at Zanzibar many circumstances concurred to recommend a preparatory trip, and the party travelled from Mombas as far as Fuga, following the course of the Pangáni river. The setting in of the rains made further progress impossible, and no new information was acquired by Captain Burton relating to the snow-capped mountains, of Kilimandjáro and Kenia. Having partly recovered from the severe acclimatising fever (which no traveller from the Zanzibar coast can avoid, and which had totally prostrated the members of the expedition), the rains having subsided, and porters, asses, guides, with an escort having been procured, Captain Burton sailed with his numerous party from Zanzibar to Baga Moyo, and at once started for the interior. Two communications have reached us relating his further progress; the last of them was dated Sept. 6th, S. lat.  $6^{\circ} 40'$ , and E. long.  $35^{\circ} 40'$ , or at a distance of about 200 geographical miles from the sea coast in a direct line. These communications consist chiefly of route maps by Captain Speke, on a large scale, together with numerous observations for latitude and elevation.

On leaving Baga Moyo the party proceeded up the Kingani river to a distance of 120 geographical miles from the sea-coast, passing over an extremely luxuriant country, very level, and abundantly cultivated, but apparently, like other great alluvial or delta accumulations on the immediate sea-board of Africa, pestilential to European constitutions. At about E. long.  $36^{\circ} 50'$  a hilly district was reached, which proved to be the face of a vast elevated tract, gradually sloping upwards towards the interior. At the point whence we last heard from Captain Burton the land had attained an altitude exceeding 2000 feet, and a still more elevated country was before him.

It will be of extreme interest when Captain Burton's report of the geology of the country shall reach us; for even the facts stated seem to bear out the opinion I advanced from this chair at the Anniversary Meeting of 1852, and which the subsequent discoveries of Livingstone corroborated in a satisfactory manner, namely, that South Africa certainly, and the whole of the continent



probably, is a vast trough or basin, encircled on all sides by higher ridges.\* It will be recollected how I then showed, that these ridges, wherever we had certain knowledge of them, consisted of primeval or palæozoic rock, for the most part crystalline—that they enclosed fresh-water deposits of younger age, and lacustrine character; and, therefore, that the main physical features of modern Africa, such as I have described them to be, are those which have continued to characterise that continent from the earlier geological epochs down to the present day.

My hearers will also recollect that, justified by the discoveries of Livingstone, I took occasion, at our last Anniversary, to throw great doubts on the existence of snow-capped mountains in these equatorial latitudes. As far as they have gone, the observations of Burton's party throw no new light on that hypothesis; and it still remains to be determined whether or not the Nile, like the Zambesi, Congo, and Niger, has its chief sources in the great watery interior plateau. (*See Ann. Address, 1857, p. clxx.*)†

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\* *See also Dr. Livingstone's Cambridge Lectures, with a Prefatory Letter by Professor Sedgwick. Edited by the Rev. Wm. Monk, &c.; with map by Arrowsmith, granted especially by the President and Council of the Royal Geographical Society.*

† Whilst these pages are passing through the press, accounts have been received informing us that Captains Burton and Speke had penetrated westwards to near 500 miles from the coast, according to their dead reckoning. They had passed from the Ugogo country, through the Mkaliki Mjumbi wilderness, had crossed the frontier of the Waniemesi, and they wrote from a place, Unianembe, 70 miles beyond it. The boundaries of the different tribes, and the physical features of the country, so far as our travellers have gone, correspond very closely to the description given of them by the Rev. Mr. Erhardt, who drew his information entirely from native testimony. It will be recollected, that a short account of his memoir, and an accompanying sketch map, were published in the first number of our Proceedings, and, if reference be made to the latter, the point on the line of route whence we have received our latest intelligence will be found to be that which is intersected by the 34th parallel of longitude. Capt. Speke places the real position of the station in question in lat. 5° 2', and considerably to the westward of that point. The doubts which I ventured to throw out in the Address of last year, respecting the existence of lofty snow-covered African mountains under the Equator whence the Nile flows, and the theoretical view (founded on the observations of Livingstone) which was then propounded, of the origin of great periodical floods by the bursting and overflow of large marshy tracts of Central Africa, might, at first sight, seem to receive some confirmation from the researches and writings of the ancients. My accomplished friend Sir Henry Holland has directed my attention to certain pages of Seneca (*Nat. Quæst., lib. vi.*), in which that author describes his having conversed with two centurions, who, in the early part of the reign of Nero, had been sent to seek out the sources of the Nile. With the assistance of the King of Ethiopia and other chiefs, they had to so great an extent accomplished their task, that further progress by water was impracticable, for they reached great jungles or marshes (*immensas paludes*) in which the smallest canoe, containing one man only, could paddle. As, however, Seneca speaks also of waters gushing from subterraneous reservoirs as probable sources of the Nile, other geographical friends, who were aware of these writings, do not believe that they are to be viewed as trustworthy accounts of the origin of the great river.

A map of the region to the north of Abyssinia, between 35° 37' long. E. of Paris, and 15° 17' N. lat., drawn upon the ground in 1857 by Mr. Werner Munzinger, has been published at Winterthur in Switzerland. Besides the small German work of Heuglin, to which allusion was made p. 284, when the merits of the old descriptions of Bruce were brought

## PHYSICAL GEOGRAPHY.

*Changes of the Surface of the Globe.*—Having gone through a variety of details respecting the progress of our science in the four quarters of the globe, I may now draw towards the end of this Address by a few notes on the general and important subject of *Physical Geography*.

M. de Francq has recently occupied himself with some laborious researches respecting the laws which may be recognized in the distribution of land and sea, and of surfaces of relative elevation and depression on the general outline of the globe. Assuming the whole mass of the earth to have been primitively in a state of fusion, and an outer crust to have been formed by cooling and consequent solidification, he concludes that when this process had arrived at a certain stage, the *shrinkage* of the interior nucleus from continual loss of heat would be greater than that of the outer crust from the same cause, and that consequently the solid superincumbent crust would partly lose its support beneath, and be left in the position of an arch or dome too weak to support itself. The result, it is supposed, would be that the shell would collapse by its own weight, and that its surface would be elevated into ridges and depressed into furrows in various directions, producing the inequalities which we now witness. In this idea there is nothing new; but M. de Francq has another assumed principle which forms the base of his very laborious researches. He assumes *that the effect of this partial crushing of the earth's solid crust will manifest itself equally along every great circle of the globe*—a result which he pointed out to myself on a small hollow globe of thin flexible substance when affected by the tightening of strings which draw it into depressions which are accompanied by parallel depressions. It might perhaps be supposed that this effect on any proposed great arc would be

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brought out, the literature of researches in Abyssinia has received in the past year a copious and instructive addition by the publication at Rome, through the Propaganda Congregation, of the work entitled '*Viaggio e Missione Cattolica fra i Mersa, i Bogos e gli Habab,*' by the missionary Giuseppe Sapeto. First visiting Abyssinia in company with the brothers d'Abbalie in 1838, and quitting it from bad health after a sojourn of five years, Sapeto made his last journey from Massowah in 1851. His personal adventures, which are told with great animation, form a part only of the contents of this well-filled volume, in which the author has amassed much valuable information respecting the physical geography, ancient divisions, and general history of this country, so gifted by nature, and now in so fallen a state, accompanied by striking sketches of its animal and vegetable productions. He has further added annotations from national documents in the Ethiopian language, with translations into Italian. I am indebted to my friend Dean Milman for an acquaintance with this work, which I had not seen when the Address was delivered, and which is well worthy of perusal by geographers and scholars.—June 30, 1853.

properly measured by the *vertical* extent of elevation or depression combined with the *horizontal* extent along the great circle. M. de Francq, however, has taken only the linear horizontal extent as the measure in question. It is for the natural philosopher and the geologist, rather than for the geographer, to pronounce on the soundness of the physical views on which these researches are founded; but the facts respecting the distribution of land and sea, of mountains, plains, and rivers, with which these investigations may make us acquainted, as well as the laws according to which they may be grouped and classified, are equally interesting to the geographer, whatever may be the physical principles on which such researches are professedly founded.

It would be impossible for me to enter into any detailed analysis of the examinations which M. de Francq has made of the phenomena along an immense number of great circles. I can offer but the briefest outline of them. In order to render the investigation as impartial as possible, he has fixed upon eight equidistant points on the Equator, beginning with the meridian of Paris. He takes through each of these points 36 great circles equidistant by  $5^{\circ}$  from each other, thus forming *four* systems (*roses*) of divergent great circles, each system passing through two opposite points of the eight above mentioned. He then examines the horizontal extent, along each great circle, of the lines of elevation (*arcs d'enhaussement*); along the remaining portion of the circle there will generally, of course, be depression. All dry land is considered as belonging to *elevation*, but the whole bed of the ocean is not regarded as belonging to *depression*; for lines along shallow coasts, ranges of islands, &c., which are only slightly and partially immersed beneath the surface of the sea, are also regarded as *lines of elevation*, being supposed in fact to lie above a certain mean surface, to which elevation and depression are referred. Moreover, these great circles frequently pass across regions which are nearly or altogether unknown, in which case he calculates the lengths of the lines of elevation in such regions on the supposition of their being proportional to the lengths of similar lines along the known portion of the great circle, and adopts these calculated lengths as the most probable lengths of the unknown lines in question. Proceeding on these suppositions, he finds (1) that on all those great circles along which the lines of elevation defined by the existence of dry land form together an arc of less than about  $100^{\circ}$ , there exist submarine lines of elevation, which, together with the terrestrial ones and those which are as-

sumed to exist in the unknown regions traversed by any great circle, make up very nearly the amount just mentioned of  $100^{\circ}$ ; and moreover, that all such great circles are each characterized by very nearly the same number of transverse lines (*alignements terrestres*) which run perpendicularly to the great circle, and are marked by salient points of the earth's surface, or are recognised as lines of volcanic action, or lines along which, at least, earthquakes are not of unfrequent occurrence. M. de Francq also finds (2) that those great circles along which the terrestrial lines of elevation constitute together an arc of more than about  $100^{\circ}$  are not accompanied by the transverse *alignements terrestres*, but by others which are parallel to their own directions respectively. These appear to be two of the principal generalizations at which M. de Francq has arrived respecting the existing geographical distribution of land and sea; and one of the most interesting deductions from them may, perhaps, be stated to be that which he draws respecting the probable existence of considerable tracts of land in the polar regions. He finds that those great circles of the first class above mentioned which traverse the polar regions are most defective in the extent of their *known* lines of elevation, but the whole arc above mentioned of  $100^{\circ}$  is made up in such cases by the calculated probable extent of such lines in the *unknown* polar regions. The harmony thus established between the great circles which traverse the polar regions, and those which lie without them, is regarded by M. de Francq as a proof of the truth of the hypothesis that a considerable extent of land exists in the neighbourhood of one or both the poles of our globe.

One of the great objects of my intelligent and indefatigable friend the Baron de Francq in publishing the ingenious memoirs\* which he has successively laid before the French Academy of Sciences, the application of his theory to some of the great geological features of the globe, as specially indicated in the last of these communications, cannot now be adequately discussed. The consideration of this vast subject, on which the eminent geologist Elie de Beaumont has written so ingeniously in propounding views which M. de Francq supports, would occupy in fact a large part of a purely geological discourse. The physical data, however, which the author has arranged and discussed with great perspicuity and infinite pains, in-

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\* De la Formation et de la Répartition des Reliefs Terrestres, Mém. de l'Académie des Sciences, 28 Fév., 24 Mars, 2 Juin, 1856, et 15 Mars, 1858. See also Bull. de la Soc. Géol. de France, 2 sér., t. x., 1853.

volve questions of high importance to every one who speculates upon the causes which have operated in producing the chains of mountains, and corresponding depressions of the earth's surface.

*Movement of Waves.*—An original view of the undulatory movements of the sea and its currents has been published at Rome\* by Commander Cialdi, of the Pontifical marine service, author of various other works of merit on analogous subjects.† It is out of my sphere to judge the merits of the work of this ingenious author, who, whilst I write, has visited London, to conduct to the Tiber two small steamboats; but I may briefly say, that after an elaborate detail of facts, drawn from the writings of a multitude of mariners, engineers, geologists, and others, to the number of nearly two hundred, and also citing his own long experience when in the Sardinian navy, he endeavours to counteract by such data the prevalent theory of eminent mathematicians, which does not admit of any real motion of transport in the molecules which constitute a wave, nor the power of waves at great depths. To give my hearers some idea of the main object of a work which has been highly commended by the Accademia dei Nuovi Leicei of Rome, as well as by the Academy of Venice, I here cite the author's own words, as conveying his main views:—

"I am convinced," says Cialdi, "that the real motion of translation (or driving movement) in an undulating mass of water always exists during violent winds and storms, whatever be the depth of the sea; and that it also obtains in moderate weather, but only where the inferior, the lateral, or the frontal development of the wave finds an obstacle, at any distance whatever from the shore. I also maintain that the motion communicates itself to the whole mass that constitutes the wave, when the latter cannot develop itself; and that the intensity of the motion is greatest at the bottom of the sea, and least on the surface, when the depth of water is relatively small, and when the wave is not broken. I further maintain that the effects of this motion are more or less perceptible according to the nature and form of the obstacle, the volume of the undulating mass, and the velocity of its propagation. Moreover, these effects must prove very complicated, and produce all the varied series of powerful phenomena that we observe on abrupt coasts, piers, breakwaters, and shelving shores."

\* 'Cenni sul Moto Ondoso del Mare e sulle Correnti di esso, 1856.'

† 'Studi Idrodinamici Nautici e Commerciali, Roma, 1845;' 'Sul Tevere e la Unione dei due Mari, Roma, 1847;' 'Studi sur Porto di Livorno, Firenze, 1853.'

*Current Charts.*—Mr. A. G. Findlay has constructed an excellent chart of the North Atlantic Ocean, on four sheets, which embodies in a condensed form the results given in the extensive series of charts published by the American Bureau of Hydrography, as well as other authorities. This chart, intended for the use of sailors, will show the connexion between the different branches of the meteorology of the sea, the similarity between the circulation of the air and water over its area, and their effects on the temperature in different seasons. Among the results it appears that the great mass of waters takes about one year to travel from the Bay of Biscay to the Gulf of Mexico, while the more rapid circulation of the smaller volume from the Mexican Gulf, by the Gulf-stream, occupies about eight months in reaching the shores of Europe. These periods, derived from a careful calculation of all attainable observations, accord very closely with that of the drift of bottles, a collection of which, made by Capt. Becher, R.N., shows that the currents are not so rapid as has been usually considered.

The Gulf-stream ceases to be a marked current after passing eastward of the Newfoundland Banks; its warm waters are then drifted to the east and north-east by the prevailing south-west and west winds, by which cause its effects are propagated to Britain and the coast of Norway.

In 1838 Mr. W. C. Redfield propounded the theory, that the Arctic currents, after passing over the Banks of Newfoundland, flowed beneath the Gulf-stream to the southward and south-westward—a theory which has been confirmed by American navigators, who have found that at a depth of 370 fathoms, or bed of the Gulf-stream, in its narrowest and warmest part, the temperature is at zero. This remarkable and exceptional phenomenon does not, however, extend eastward of  $46^{\circ}$  W. meridian; for Commander Dayman found in that longitude that the water had a temperature of  $39^{\circ}\cdot7$ ,\* at a depth of 1000 fathoms, in two instances, showing a remarkable contrast in so small a distance.

The Arctic current had been considered to be lost at Cape Hatteras, in its south-west course; but the cold bands which have been observed by the American surveyors to exist in the Gulf-stream must be derived from this source. There is another curious subject for consideration—the peculiar configuration of the coast of the

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\*  $39^{\circ}\cdot5$  is the temperature assumed by Sir Jas. Ross as that at which sea-water has its maximum density.—*Voyage to the South Pole*, ii. 156, 375, 384.

United States between Cape Hatteras and Cape Fear. These, as Mr. Findlay has suggested to me, may be the result of the conflicting hot and cold currents there neutralising each other, and producing those long sand ridges projecting transversely to the direction of the two streams from Cape Hatteras, Cape Fear, and Cape Lookout, which promontories are separated by long sweeps of low diluvial shores. This reasoning is indeed sustained by another fact, evident on a close examination of Maury's thermal charts, viz., that the Arctic current, or other very cold water, flows to the south-east from off these capes to the southward of the Bermuda Isles.

*Deep-Sea Soundings—Geological Analogies—Atlantic Telegraph.*—At our last Anniversary your attention was riveted to the great project of establishing a communication between Britain and America, and the preparations for carrying out that noble project. Among these I announced that the paddle-wheel steam-frigate the *Cyclops* had preceded the *Agamemnon*, and that steps had been taken by the Admiralty to secure for naturalists all the materials, whether animal or vegetable, which might be brought up from the sea bottom. This object has been efficiently carried out across the North Atlantic, between Valentia in Ireland and the coast of Newfoundland, the methods employed, and the results, having been clearly reported by the commander of the vessel, Lieut. Dayman. The apparatus employed was a modification of that invented by Mr. Brooke, of the United States Navy, and the results have unquestionably given us a much more extended knowledge of the bed of the Atlantic, and of the temperatures and densities of its waters, than were ever before obtained, thanks to the excellent conduct of the officers and men employed.

Referring to the printed Report for many instructive data respecting the meteorology of the ocean, I will now briefly allude to the support which has been given to geological science by the operations of the officers of the *Cyclops*. The submarine section, which is given at the bottom of Plate 1 of the Report, teaches us, as before said, that, in the 15° of W. long., or about 180 miles from the shore of Ireland, the plumb-line suddenly descends from 550 to 1750 fathoms. This wall of 1200 fathoms in height suggests the idea of one of those former movements by which the crust of the earth has been broken through by a long and deep fissure or sudden disruption.

Another feature of great geological interest is, that having once quitted the comparatively shallow water on the coast of Ireland,

all the soundings, twenty-six in number, which were made in crossing the deep ocean, or between the  $15^{\circ}$  and  $45^{\circ}$  of W. long., with two exceptions, when stones and shingle were met with, have proved that the bottom, whether at the maximum depth of 2424 fathoms, or of 954 fathoms on nearing the shores of Newfoundland, is composed of a soft mealy substance, to which Captain Dayman gives the name of ooze.

Now it was a point of great interest to the geologist (one in which I took some personal interest before the expedition sailed, by communicating with Captain Washington, the Hydrographer) to collect any organic bodies brought up from these extreme depths. At my request, indeed, Professor Huxley drew up instructions for the proper preservation of any such objects, which were carefully carried out by Commander Dayman and Dr. Gimlett, the medical officer of the expedition. The specimens of ooze, which have been examined by Professor Huxley, of the Government School of Mines, have led him to believe that nine-tenths of this fine muddy deposit consist of the minute animal organisms called Foraminifera, composed of carbonate of lime, and that 85 per cent. of these are referable to the genus *Globigerina*, in all its various and multiform stages of growth.

Great as is the interest attached to the question, of whence this infinite quantity of these small creatures, mixed with some other Foraminifera, is derived, Professor Huxley does not pretend as yet to be capable of answering it entirely; but, knowing that highly organised animals can live at depths of 300 or 400 fathoms, he is disposed to think that these vastly humbler creatures may have existed at the great depths from whence they are dredged up. Now this ooze, or fine marine mud, not a little resembles our chalk, which also contains the same genus *Globigerina*; and just as the chalk has similar persistent characters, from the cliffs of Albion to Orenburg in Russia,\* so this submarine ooze maintains the same aspect and composition over a nearly equal breadth between Britain and America.

Let us hope that, when our Admiralty again decides upon obtaining a systematic series of deep-sea soundings, a professed naturalist will be one of the party, in order that, among many curious problems relating to submarine life, he may determine whether foraminifera can exist at such great profundities, or whether, living

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\* See 'Russia in Europe,' vol. i., p. 272.



at a higher zone, they have on dying simply subsided, to form the chief part of the fine, undisturbed, muddy bottom.

In the mean time the survey of the *Cyclops* has shown, that a perfectly tranquil and secure resting-place is ready for the reception of the greatest length of the cable of the magnetic Atlantic telegraph. May then the accidental misfortune of last summer be avoided, and may the able and vigorous measures of the Company employed in carrying out this grand international work be eventually crowned with all the success they deserve.

*Conclusion.*—I have now, Gentlemen, to apologize for having detained you so long in my endeavour to lay before you, not merely an analysis of our own labours, but also of those which have been in progress in most parts of the world, together with brief indications of the theoretical as well as practical appliances by which geographical science has been advanced. Let me conclude then with a few words on some of our own immediate operations as sustaining the reputation of the Society, and as influencing public opinion.

The volume of our Journal, the 27th in number, which has recently been issued, has, I trust, been found equal in merit to any one of former years. The mere announcement of some of the names of the contributors and subjects sufficiently testifies that we are well working out our varied objects of research. Thus, whilst the soldier and scholar are gratified with the scrutiny of certain campaigns of the ancient Greeks placed before us by General Jochmus, as derived from a critical examination by him of battle-fields and marches, other comparative geographers may trace with Loftus the course of the Eulaeus.

In delineating those parts of Persia with which he has long been familiar, General Monteith has shown us the lines by which bodies of men can advance, and those where great difficulties must be encountered: whilst Rawlinson, comparing ancient with modern geography, has clearly demonstrated the extent to which the delta of the Euphrates has advanced upon the Persian Gulf in the historic period. Again, in the same region Abbott describes the route from Shiraz to Fessa and Darab; and in turning to the hitherto slightly known country of Burma, we have been furnished with a comprehensive, clear sketch of its geographical features by Captain Yule.

From Africa (not to speak of other contributions) we have those original letters of Livingstone which foreshadowed the admirable work which that explorer was destined to produce; whilst from

British America we have put forth Colonel Grant's practical and useful account of the large island of Vancouver, now rising into vast importance through its fine bays and ports, both as a noble station for maritime enterprise in the Pacific, and a future scene of commerce with our newly discovered golden region in the Rocky Mountains.

In short, all our publications, so ably edited by Dr. Norton Shaw, whether they appear in the more matured and staid form of the Journal, illustrated by those excellent maps of Arrow-smith, which give an impress of accuracy to every work of which they form a part, or those popular Proceedings which keep up the "esprit de corps" of our members, and are constant mementos of the animation of our Evening Meetings, have, I am happy to say, given general satisfaction to all readers.

Rejoicing at our last Anniversary at the great rise of this Society in public estimation, it is truly a source of pride and satisfaction to me to see that in the short interval which has elapsed, 166 new members have joined our ranks, and that we now reckon nearly 1100 ordinary associates, or nearly double our numbers in earlier years.

The grant of the use of their apartment for our meetings, by the University of London and the Royal Society, has been of signal advantage; and many of you can testify that the attendances have been so good as almost to crowd that spacious hall.

Let us hope then that this liberal encouragement will be continued; for no one who has participated in our Evening Meetings can doubt that they are productive of enlightening effects upon society in general, by the diffusion of a much greater love of geographical science and foreign travel than was ever before exhibited in this metropolis. I do not hesitate therefore to assert, that the Royal Geographical Society has now taken such firm root in our country, both as regards commercial and public affairs, as to have become part and parcel of the common-weal. Thus, many of Her Majesty's Secretaries of State, whether past or present, belong to us, and afford us the best support by the transmission of documents which we publish at our own expense, and which, though of great importance to geographers as well as to merchants and travellers, would without our aid have remained unknown. Then again, our Map Office in Whitehall Place is the rendezvous for any persons, official or private, who may desire to consult the best geographical documents; this great public advantage being gained simply

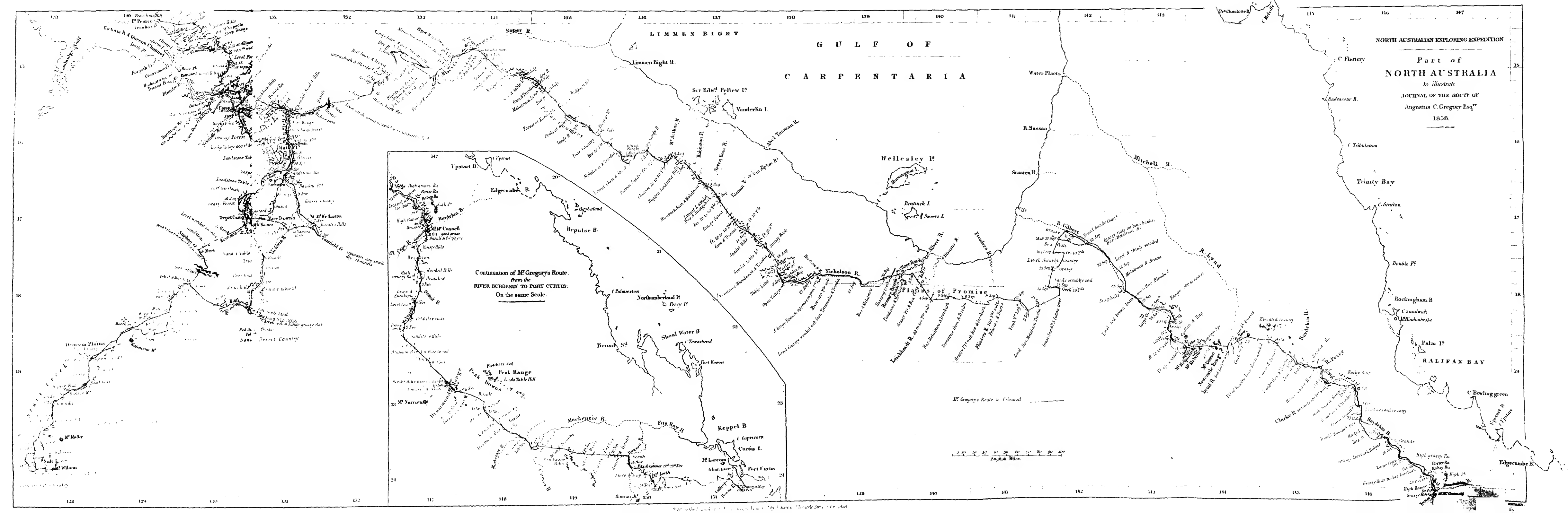
by the grant of 500*l.* per annum—a sum I venture to say not amounting to a tenth part of what would be incurred, if our highly useful and really national establishment were managed by any Government.

High as we have risen in the last few years, I feel indeed confident from what I see around me, and from a pretty intimate acquaintance with the mainsprings of our prosperity, that our future career may be rendered permanently useful and brilliant, provided only there be a continuance of the same hearty union and good fellowship which now so happily prevail among us. For the part I have borne in this cheering progress, whether in aiding the onward march or in sustaining the dignity of the Royal Geographical Society, I can with gratitude say that my poor efforts have been much overpaid by your kind approbation. Let me then assure you, that as by a sort of friendly fiction, you have evaded the regulations which prescribe that your Presidents should successively retire from office after two years' service, and are pleased to view my first year's labours during the present consulate, as having been given for my lamented predecessor Admiral Beechey, I will try to perform my duties as before, and will not shrink from the endeavour to render my seventh year of probation as effective as any one of my preceding terms of office.

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P.S.—An important geographical feature in the outline of the western portion of the Himálava Mountains has come to my knowledge since this Address was printed. By permission of our Associate and Gold-medallist, Col. Andrew Scott Waugh, Lieut. T. G. Montgomerie has published, in the fourth number for 1857 of the *Journal of the Asiatic Society of Bengal*, a Memorandum on the Snowy Mountains of the Kashmir series of the Himalayas, in which the Nanga Parbat or Dagarmur, to the north of Kashmir, is estimated at a height of 26,629 feet above the sea.





## PAPERS READ

BEFORE THE

## ROYAL GEOGRAPHICAL SOCIETY.

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I.—*Journal of the North Australian Exploring Expedition, under the command of AUGUSTUS C. GREGORY, Esq. (Gold Medallist R.G.S.); with Report by Mr. ELSEY on the Health of the Party.*

Communicated by the COLONIAL OFFICE.

Read, June 22, 1857.

July 18, 1855.—The arrangements for the departure of the North Australian expedition being complete, and the stores, &c., shipped on board the *Tom Tough* schooner and barque *Monarch*, the portion of the exploring party which was in Sydney embarked in the vessels in the following order:—The *Monarch*, Mr. A. C. Gregory, commander; Dr. Mueller, botanist; Mr. Flood, collector; overseers, Phibbs and Humphery; stockmen, &c., C. Dean, H. Richards, J. Fahey. The *Tom Tough*, Mr. J. Wilson, geologist; Mr. T. Baines, artist; Mr. Elsey, surgeon and naturalist; stockmen, &c., Dawson, Selby, and Shewell. At 2 P.M. sailed for Moreton Bay, where Mr. H. Gregory had collected the horses and sheep ready for embarkation. At 5 P.M. passed the heads at the entrance of Port Jackson, and steered N.N.E. with a fine southerly breeze.

July 19.—On board the *Monarch* for Moreton Bay. Fine southerly breeze, with occasional showers of rain. The *Tom Tough*, having kept closer in to the land, was not visible at daybreak.

July 20.—As before. Moderate breeze, s. to s.E. Cloudy, with rain.

July 21.—At noon passed Cape Moreton, and at 1-30 anchored off the N. end of Moreton Island. Shortly after the pilot came on board; but the wind being southerly, could not proceed farther.

July 22.—At 8 A.M. weighed with the flood tide and passed through Freeman Channel; but the wind being southerly, did not make much way. Sighted the *Tom Tough* about 5 m. to the s. At 6 P.M. anchored off the bar of the Brisbane River. Mr. Baines, and Captain Gourlay, the master of the *Tom Tough*, came on

board from the schooner, which was at anchor  $\frac{1}{4}$  m. S.E. of the *Monarch*.

*July 23.*—At 8 A.M. weighed with a light breeze and stood in for the mouth of the river; but it being ebb tide, anchored at 2 P.M. till 5 P.M., when we again stood in for the bar, on which we grounded at 4 P.M. Got out a warp and kedge, but only moved the vessel a few fathoms. At night the tide was unusually low.

*July 24.*—At sunrise the tide had fallen to  $7\frac{1}{2}$  ft. on the bar. At 10 A.M. left the *Monarch* in the boat and proceeded to Brisbane, which place we reached at 2 P.M. Arranged with Mr. H. Gregory to ship the stock as soon as the vessel was towed up the river.

*July 25.*—Making preparations for the embarkation of the stock, and preparing accounts, &c.

*July 26.*—The *Monarch* not having arrived at Brisbane, I proceeded to the bar of the river and found that she had been detained by the low tides, but had just floated over into deep water at sunset. The *Ballarat* steamer had been engaged to tow the *Monarch* up to Brisbane; but having struck on a rock near Ipswich, had sunk. The *Monarch* did not reach the Eagle Farm flats before the tide ebbed, and therefore anchored inside the bar. Made arrangements to tow her up the river with the *Hawk* steamer.

*July 27.*—Returned to Brisbane by boat. Making up accounts, &c. Engaged Stuart MacDonald as stockman, at 6s. per diem, for the service of the expedition.

*July 28.*—The *Hawk* steamer being unable to tow the *Monarch* over the Eagle Farm flats, returned to Brisbane for coal. Purchased a horse from J. Alford for 25*l.* to replace a horse which had been lamed at Darling Downs, and sold to Mr. Douglass as unfit for the service of the expedition. Engaged John Melville as stockman, at 6s. per diem.

*July 29.*—Rode to the Eagle Farm flats, where the *Monarch* was aground with only 3 ft. water under the fore chains at low tide. The anchor having been moved to a more convenient position, at 11 P.M. hauled the vessel into deep water and towed her by the steamer to the left bank of the river, and moored her in 4 fathoms about 20 yards from the dry bank, as it did not appear prudent to attempt to take so large a vessel up the river to Brisbane, for the delay in recrossing the flats might cause the detention of the vessel till after the next spring tides, at which alone there was sufficient depth of water. Under these circumstances I deemed it advisable to bring the stock by land to Eagle Farm, and ship them below the flats, as one tide would be then sufficient for the vessel to clear the river. Returned by the steamer to Brisbane.

*July 30.*—Moved the horses and sheep to Eagle Farm pre-

paratory to embarking them the following day. Went on board the *Monarch*.

*July 31.*—Embarked the 50 horses and 100 sheep on board the *Monarch*. Mr. H. Gregory returned to Brisbane to close accounts for forage, &c.

*August 1.*—Embarked the remainder of the sheep, 100 in number. At 4·20 P.M. the steamer *Bremer* took the *Monarch* in tow; but the tide ebbing fast, the tow-line broke, and the vessel grounded on a bank about a mile below the flats, the steamer proceeding to the Blackfriars with cargo. At 8·45 the *Monarch* floated, and at 10·45 the *Bremer* returned and towed us towards the bar; but at 12·45 the vessel anchored and the steamer returned to Brisbane, the pilot asserting that it was not safe to attempt to cross the bar, as he could not be certain of finding the channel. Wrote to the Colonial Secretary, acknowledging receipt of his letter of the 17th July, transmitting instructions relative to the North Australian expedition.

*August 2.*—Remained at anchor inside the bar of the Brisbane River. At sunset the *Tom Tough* moved to the same anchorage. The steamer did not come down from Brisbane, and the wind being unfavourable, we could not cross the bar, although there was 10½ ft. water, and the vessel only drew 9 ft. 10 in. Mr. Flood, overseer Humphery, and H. Richards, removed to the *Tom Tough*.

*August 3.*—Brought the *Tom Tough* alongside the *Monarch*, and shifted 30 trusses of hay on board the schooner, which lightened the barque about 2 inches astern. Sent Mr. H. Gregory to Eagle Farm to purchase hay for the stock, as it was necessary to maintain a full supply for the voyage, and there is every prospect of considerable delay, as the tides are approaching the neaps. Mr. Dibbs proceeded to Brisbane, and returned in the evening and stated that he had been unable to engage the services of any of the steamers, as both the *Ballarat* and *Bremer* were under repair, and the *Hawk* at Ipswich. The wind being N.N.W., the pilot stated that the vessel could not be moved over the bar under existing circumstances.

*August 4.*—During the night the *Tom Tough* crossed the bar under sail, and the master reported that he found 11 ft. at the shoalest part. The harbour-master came on board and stated that it would not be practicable to cross the bar till the 9th, and that it was not safe to move the vessel nearer to it. Landed on the outer island to cut grass for the horses. The aboriginal stockmen, who had been partially engaged at Brisbane, having absconded when the vessel entered the river, it was determined to obtain others from the Moreton Island tribe, among which there are several suitable aborigines.



*August 5, Sunday.*—Remained at anchor in the Brisbane River.

*August 6.*—Weighed with the flood-tide and ran in to the 3-fathom hole, inside the bar. Landed with a party to cut grass for the horses. Sent Mr. H. Gregory to Brisbane to procure hay for the stock, as the forage on board the vessel was insufficient to meet the extra consumption caused by the protracted delay of the vessel after the horses were shipped.

*August 7.*—At 5 A.M. weighed and ran for the bar; but the night-tide not being so high as usual, the vessel grounded about  $\frac{1}{2}$  m. inside the middle beacon. In the evening warped the vessel up to the middle beacon. I observed that though the *Monarch* only drew 9 ft. 9 in. by the marks on the stem and stern, yet the actual draught of water was 10 ft. 6 in. Received a letter from Mr. Dibbs, the agent for the owner of the *Monarch*, requesting that the certificates of the performance of the charter party, to the present date, should be transmitted by post to Mr. Sayers, the owner. Received a letter from D. Gourlay, the master of the *Tom Tough*, requesting a certificate of the performance of the charter party of the *Tom Tough* to the present time.

*August 8.*—Wrote to Captain Gourlay, in reply to his letter of yesterday. At 3 P.M. the tide rose to  $10\frac{1}{2}$  ft. on the bar, and the *Monarch* was warped out of the river and at 6:30 anchored in the outer anchorage near the *Tom Tough*.

*August 9.*—At 3 A.M. Mr. Dibbs, the supercargo of the *Monarch*, proceeded to Brisbane, and shortly after the vessel weighed and stood over for Moreton Island with a light breeze, and at 9:30 anchored off the watering-place between Cowan Point and the Pilot station. Commenced taking in water, and got about 3 tons on board. The water at this place is excellent, and flows in a small stream from an extensive swamp at the foot of the sand hills, which occupy the greater portion of the island. The best spot for the purpose of watering is about  $1\frac{1}{2}$  m. s. from the Pilot station,  $\frac{1}{4}$  m. from the shore, where the water deepens suddenly from 3 to 10 fathoms. The *Tom Tough* remained at the anchorage off the bar of the Brisbane River, to take in hay for the stock on board the *Monarch*.

*August 10.*—The *Tom Tough* came over from the anchorage at the Brisbane River, Mr. H. Gregory having obtained 4 tons of hay which was brought down by the *Bremer* steamer and transhipped to the *Tom Tough*, and brought over to Moreton Island and embarked in the *Monarch*. Continued to take in water, but only procured  $4\frac{1}{2}$  tons during the day.

*August 11.*—Completed the water on board the *Monarch* and *Tom Tough*. Wrote to the master of the *Tom Tough*, transmitting instructions with reference to the voyage to the Victoria River, &c.

*August 12.*—Wrote to Captain Wickham transmitting certificates of the performance of the charter party of the *Monarch*, to the period of sailing from Moreton Bay. Wrote to the Colonial Secretary, reporting proceedings to date. At 10 A.M. weighed and stood out of Moreton Bay in company with the *Tom Tough*. At 11 the pilot left the vessel, as she was clear of the banks; she then continued a northerly course.

*August 13.*—At 2 P.M. passed Breaksea Spit and continued along the coast, with a fine S.E. breeze.

*August 14.*—At daylight off Port Curtis, and at 5.30 P.M. passed Port Bowen, and stood off and on till daylight.

*August 15.*—At daybreak the *Tom Tough* was off the High Peak, or No. 1, Northumberland Island. Passed to the E. of No. 1 Island, and at noon passed to the W. of the 2nd Percy Island, the *Tom Tough* in company. At sunset off (k 1) of the Cumberland. At 11 P.M. passed about 2 m. N.E. of (l 2) and continued a N.W. course, under very easy sail till daylight. Two sheep died in the night.

*August 16.*—At sunrise off Pentecost Island, and made all sail; passed close to N.E. of the Northern Cumberland Island. At 11 off the Great Island. Moderate breeze from S.E., light clouds and slight showers of rain. At sunset sighted Cape Upstart, and continued course under easy sail during the night, the wind being very light from the S.E.

*August 17.*—At daylight off Cape Bowling Green, and at noon passed Cape Cleveland; light easterly winds. At midnight anchored off the N.W. side of Magnetical Island in 8 fathoms  $\frac{1}{3}$  m. from the beach.

*August 18.*—At sunrise weighed with a light variable breeze, with showers of rain; and passing to the W. of Palm Island sought an anchorage under the Northern Island, but finding 14 to 20 fathoms  $\frac{3}{4}$  m. from the shore lay to till 2 A.M. the next morning. The *Tom Tough* ran close into the second Northern Island, and anchored in  $9\frac{1}{2}$  fathoms,  $\frac{1}{2}$  m. from the shore in a small bay. At 10 P.M. lowered the boat and went on board the *Tom Tough* to arrange for sailing in the morning. Returned to the *Monarch* at midnight. Vessels should anchor to the W. of the largest of the three Northern Palm Islands, as the water off the other two is much deeper than shown on the charts, the depth varying from 14 to 20 fathoms.

*August 19, Sunday.*—At 2 A.M. made sail, and with light variable breeze (with showers); at daylight Point Hillock opposite Mt. Hinchinbroke. The breeze freshened till noon from E.N.E. when we passed Rockingham Bay, the *Tom Tough* 4 m. astern. At 7 P.M. anchored under the Northern Island of the Barnard group, and at 8 P.M. the *Tom Tough* anchored  $\frac{1}{2}$  m. W. in  $9\frac{1}{2}$  fathoms.

*August 20.*—At 5 A.M. weighed, and at 11 passed 2 m. to the w. of the Frankland Islands. Light variable breeze, with showers of rain. At 2 P.M. passed between Cape Grafton and Fitzroy Island. At 3 off Green Island, and continued course toward Cape Tribulation, the *Tom Tough* 3 m. a-head; at 6:30 hauled to the w., and gradually shoaled from 16 to 12 fathoms, and anchored at 7:25 P.M., it being unsafe to pass the low islands in the night. Moderate breeze from s.; cloudy.

*August 21.*—Weighed at 6:30, and at 8 A.M. passed 2 m. E. of Low Island, and at 1:30 P.M. Hope Island. At 6 anchored on the w. side of Low Island. Landed in the boat. The island was well grassed, and partially wooded on the N.W. side; but the S.E. side (as in most of the low islands on this coast) is covered with mangrove. The *Tom Tough* had reached Snapper Island last night, and this anchorage several hours before the *Monarch*.

*August 22.*—At 5:45 weighed, and steered for Lizard Island (the *Tom Tough* taking the inner passage); passed between Lizard and Eagle Islands, and then steered for No. 1 of Howick group, passing between No. 2 and No. 3 at 12:45. The passage between these islands is somewhat incorrectly laid down on the chart, as the passage is quite open when steering direct for Noble Island. At 2:30 P.M. anchored off the N.W. side of No. 6, along with the schooner, in  $9\frac{1}{2}$  fathoms. Landed on the island, which is coral and sand with a wide belt of mangrove, except to the N.W., which has a rocky beach. Great quantities of pumice stone exist on the island.

*August 23.*—At 6:30 A.M. weighed, and passed Cape Melville at 9. At 10:40 passed about 50 fathoms to the s. of what appeared to be a small rock with about 1 fathom on it, Cape Flinders bearing w. by s., and the E. point of Flinders Island s.  $\frac{1}{2}$  w. The water hereabouts was much discoloured, but no bottom at 6 fathoms. There is also a shoal patch  $\frac{1}{2}$  m. to the N. of this rock. At 11 A.M. 1 m. from Cape Flinders. At 3 passed between Pelican Island and No. 1 Clermont Island. 6:15 anchored  $\frac{3}{4}$  m. W. of No. 6 Island, the *Tom Tough* in company.

*August 24.*—At 6 A.M. weighed; at 1 P.M. passed Cape Direction, at 6 off Weymouth Bay, and at 7 anchored in 13 fathoms, the *Tom Tough* being at anchor 1 m. N.

*August 25.*—At 6 A.M. weighed, at 7:20  $\frac{1}{2}$  m. E. from Piper Island shoals, the *Tom Tough* passing between the two groups of islands. At 9:40 passed to the E. of the Home Islands, the *Tom Tough* passing between the islands and Cape Grenville. At 6 P.M. anchored at Cairncross Island, and landed. The island is low and sandy, but densely covered with brush. There were marks of some person having visited the island about a week before. One of the sheep died. Capt. Gourlay reported the

passage inside the Home Islands to be clear of dangers. This is important to vessels following the Inner Route, as it is a close-haul to pass outside the islands with an easterly breeze.

*August 26.*—Weighed at 5 A.M. and steered for Port Albany. Off Newcastle Bay a canoe came alongside with seven natives, who spoke a few words of English. They bartered some tortoise-shell and mother-of-pearl shells for tobacco and biscuit. At noon anchored in Port Albany, the *Tom Tough*  $\frac{3}{4}$  m. N.W. Landed and examined the island, which is partially covered with dense brush or wooded, but about one-third is open and thinly grassed. The principal rock is a dark ironsand-stone, which produces a poor soil by its decomposition. The only fresh water found was a small spring at the bottom of a cove on the beach, about 100 yards to the N.W. of the landing place at the N. end of the sandy beach, but the supply is very small and quite unavailable for watering vessels. Fuel is abundant, but the beach being fronted by a ledge of coral, there is great difficulty in loading boats. Several natives were seen, and two men came down to the party, and behaved in a very quiet manner: they spoke a few words of English. The anchorage in Port Albany, at first sight, appears excellent: being safe and easy of entrance and egress, it is preferable to most of the other ports on this coast. The tide, however, runs through between the island and the main from 5 to 6 knots, and the time of slack-water does not exceed 15 minutes. The *Monarch* anchored out of the full strength of the tide under the shelter of a rocky point, but the eddy of the current caused the vessel to sheer about, and the chain fouled the anchor.

*August 27.*—At 3.30 A.M. the chain fouled the flue of the anchor, and the *Monarch* was swept into the centre of the channel; set the jib and with some difficulty weighed the anchor, and then ran up to the *Tom Tough* and anchored at 6.30. Hauled the schooner alongside and shifted the hay into the barque. At 12.30 weighed and stood out of Port Albany, by the N.W. entrance, with a fresh breeze from S.E.; and at 3 P.M. anchored in Endeavour Strait, and soon after the schooner also anchored near us. While in Port Albany several natives were seen on the mainland, and a canoe came alongside, but was swept past by the tide. Wrote to the master of the *Tom Tough* a letter of instructions. Issued general order No. 3, establishing the order of seniority among the officers of the Expedition.

*August 28.*—At 5.40 A.M. weighed and sailed in company with the *Tom Tough* for the Victoria River. A canoe came off from Prince of Wales Island, and bartered several articles with the schooner, and came alongside the *Monarch*. The blacks spoke a few words of English and were anxious to obtain tobacco, which they smoked in a pipe of bamboo 2 ft. in length, and 2 in. in

N. 332° E. mag. .. ..	Monarch on the reef.
242° } .. ..	Quail Island.
247° }	
33° .. ..	Point Charles.
167° .. ..	Raft Point.

Landed on the reef, and walked over to the *Monarch*, it being low water. Mr. H. Gregory reported that one of the horses had died that morning, and also that a sheep had died (this was the sixth sheep lost). The *Monarch* had shifted about 10 ft. last tide, but had not floated: about 30 ft. of the false keel was torn off. At 6 p.m. returned to the schooner, and at 10 o'clock brought over extra men to assist in heaving the vessel off next tide, which we expected would be sufficiently high to float her. At 11 p.m. the tide began to make from the n.w.

Sept. 10.—At 4:15 the vessel floated, and was warped off the reef, and, with a light northerly breeze, worked to the eastward, and anchored in  $4\frac{1}{2}$  fathoms  $\frac{3}{4}$  m. n. from the schooner. Besides the loss of a portion of the false keel, and a few sheets of copper, the *Monarch* does not appear to have received any material injury. At 9:40 a.m., having returned with Messrs. Wilson and Flood and the men to the *Tom Tough*, the two vessels got under weigh, the *Monarch* taking the northern and the schooner the southern passage out of Port Patterson, the least water in the latter being 2 fathoms at low water. Light breeze from the n. and n.w. Having cleared the reefs, lay to for the *Monarch*, which was several miles to the north, and at dark anchored in 18 fathoms, about 10 m. n.w. from Quail Island.

Sept. 11.—At 6 a.m. weighed and stood to the s.w., the *Monarch* about 7 m. to the east. Very light breeze n. and n.w. At 6 p.m. the w. extreme of Cape Ford bore south 5 m. Tacked and stood to the n. and n.w. till 30 min. after midnight, the breeze being westerly, and very light and variable.

Sept. 12.—Steered s.s.w. with light airs till 6 p.m.; lat. at noon,  $12^{\circ} 36' 37''$ . At sunset the peak of Peron Island bore s.e. by s. 8 m. Strong tides set to the northward. About 8 p.m. the *Monarch* either tacked or anchored, and we lost sight of her light, and did not rejoin her till she reached Point Pearce.

Sept. 13.—At 6 a.m. Cape Ford bore e. by s.  $2\frac{1}{2}$  m. 15 fathoms, no bottom. Steered s.w. with very light airs, the sky cloudy. At 6 p.m. Tree Point e. 1 m.  $2\frac{1}{2}$  fathoms. Tide setting strong into Port Keats. At 6:30 tacked and stood to the n.n.e., and at 8 p.m. anchored about w. from Tree Point.

Sept. 14.—At 5:45 weighed and stood towards Cape Hay with a light breeze from n.w.; least water  $4\frac{1}{2}$  fathoms. At 7 a.m. Cape Hay w.s.w. 1 m., tacked and steered e. by n. 1 hour, and then tacked to the s.w., cleared the shoals off the cape, and

steered for Point Pearce. By merid. alt. noon, lat.  $14^{\circ} 10' 52''$ . At 5 P.M. passed  $1\frac{1}{2}$  m. w. from Point Pearce; least water 6 fathoms; saw slight indications of the Mermaid reef, but there was no break on it. At 6:30 P.M. anchored in 6 fathoms N.W.;  $2\frac{1}{2}$  m. N.W. from Fossil Head. Hoisted lights during the night.

Sept. 15.—As it appeared from the time which had elapsed since parting from the *Monarch*, that she had probably gone on to Blunder Bay, we weighed at 11:30, and steered s. by w. with a moderate breeze from w. by N., the tide ebbing strong. At 3 P.M. passed between the sandbanks at the entrance of the Victoria River, and at 6 were abreast of Observation Island, having 8 fathoms to this point, but off the island it shoaled to 2 fathoms, and again deepened to 8 and 9 to the point of Entrance Island, which we reached at sunset. Continuing our course up the river to Blunder Bay, with a strong flood tide, and at 8:45 P.M. anchored in  $4\frac{1}{2}$  fathoms, close to the south shore.

Sept. 16.—At 4:45 A.M. the tide fell, and the schooner grounded on the mud-bank, which was nearly dry at 6 A.M., and the flood commenced at 6:30. Landed at 9 to search for water and grass for the stock. The landing was bad, the current running very strong at the only rocky point which was accessible, the rest of the south shore being muddy and covered with mangrove. Found one small pool of brackish water, and also a small quantity of fresh water in a deep fissure in the rocks, but quite inaccessible for the stock. Richards, who was one of the party, had a sunstroke, and we had to return with him to the vessel at 1:30. The country near Blunder Bay appears very rocky and unfit for the purpose of landing the horses, there being very little water, and only coarse dry grass, besides which the landing is only practicable for about one hour each tide, as the current runs with great rapidity, and the rocky point at which alone the horses could be landed is especially exposed; the other parts of the shore are muddy, and covered by a dense brush of mangrove, and intersected by muddy creeks. At 2:45 weighed and beat down the river with the ebb-tide. At 5:20 grounded on the bank on the w. side of the river, a short distance below the "Highwater Inlet," but the tide soon flowing, we floated off and anchored.

Sept. 17.—At 3 A.M. hove short, but, as there was no wind, and the flood was still running, remained at anchor till the tide turned at 4 A.M., when we weighed and ran down with the ebb till 7, when we anchored till 10:30, and again commenced beating down the river till 7 P.M., when we anchored in 5 fathoms, between the entrance sand-banks, as we could not stem the flood-tide.

Sept. 18.—At 5 A.M. hove short, and at 8, when the tide

turned, weighed, and at noon cleared the entrance banks, steering close-hauled on the starboard tack for Point Pearce, the breeze being light from the N.W. At 2 P.M. saw the *Monarch* at anchor in Treachery Bay, and at 5 anchored near her. Went on board the *Monarch*. In consequence of the small quantity of water remaining on board, Mr. H. Gregory had deemed it advisable to land the horses without waiting the return of the schooner from Blunder Bay, he having found water at the foot of Providence Hill. Fourteen horses and fifty sheep had been landed, but one of the horses had got so completely entangled in the mangroves and deep mud that he could not be extricated. Such of the horses as could travel had been driven to the swamp at Providence Hill, where there was abundance of both grass and water. Having established a party on shore, I returned to the schooner, and procured some water for the horses on board the *Monarch*.

*Sept. 19.*—Landed 14 horses, and removed 13 to the swamp at Providence Hill. The great distance the horses have to swim in landing (1½ m.), and the strength of the tide, which is so great that it is only during the ebb that landing is practicable, render the work of disembarkation very tedious and laborious. Removed the sheep from the *Monarch* to the *Tom Tough*, and procured a supply of water from the schooner for the horses. Several of the sheep landed died from drinking salt water, as the boat could not reach the shore, and they had to be driven through the shallow water to the beach.

*Sept. 20.*—Continued to land the horses, but owing to the strong tide, and some of the horses being extremely weak, three were drowned; sixteen, however, were landed alive. Brought some water from the swamp for the sheep which had been landed, but could not travel to the water; several sheep died.

*Sept. 21.*—Landed the last of the horses, and removed the remainder of the bran and maize to the *Tom Tough*.

*Sept. 22.*—Moved the party on shore to the swamp at Providence Hill, and formed a camp. Completed the removal of the stores from the *Monarch* to the schooner. Proceeded to the camp with the whole party except Shewell and Richards, who remained to attend to the sheep on board the schooner.

*Sept. 23, Sunday.*—Wrote to the Governor-General of Australia detailing the proceedings of the North Australian Expedition to date; also to Captain Fremantle, the senior Naval officer on the Australian station, on the same subject; also to the Secretary of State, forwarding a copy of letter to the Governor-General. Returned to the vessels with Messrs. H. Gregory, Elsey, and Baines. Wrote to Captain Robinson, the master of the *Monarch*, stating that the services of the vessel were no longer

required. Gave Mr. Dibbs (Mr. Sayers's agent) duplicate certificates of the performance of the charter-party of the *Monarch*. Wrote to the Accountant-General of the Navy advising him of the same, and forwarding a triplicate of the certificate. Purchased of Mr. Dibbs 1000 lbs. of biscuit, at 30s. per 100 lbs.

Sept. 24.—Mr. H. Gregory proceeded to the camp, and Mr. Flood returned to the schooner. Wrote to the master of the *Tom Tough*, instructing him to proceed up the Victoria River, and there await the land-party. Wrote to Mr. Wilson, instructing him to proceed in the schooner in charge of the party on board, and establish a camp on the upper part of the Victoria. Embarked the remainder of the sheep which had been landed, with the exception of four, which were retained for the use of the party on shore. Landed and proceeded to the camp. The *Monarch* sailed for Singapore at 7 A.M. Mr. Wilson returned to the schooner with Dawson, and the *Tom Tough* sailed for the Victoria river, the party on board consisting of the following persons: Messrs. Wilson, Baines, Elsey, Flood, Overseer Humphery, W. Shewell, W. Selby, W. Dawson. The land party consisted of the following persons, ten in number: Messrs. A. C. Gregory and Mr. H. C. Gregory, Dr. Mueller, Overseer Phibbs, R. Bowman, C. Dean, H. Richards, J. Melville, J. Fahey, S. Macdonald. At 10 A.M. started with Mr. H. Gregory from the camp, to examine the country to the eastward. Found it generally level and wooded with Eucalypti, Cypress, Banksia, Pandanus, and Cycas. A few sandstone hills were observed to the northward, from which small running streams trended towards the coast; on their banks some small patches of grassy land were seen. Four of these brooks were crossed in the first 5 m., after which we travelled for 7 m. without finding any water-courses. Returned to the camp at 6.15 P.M.

Sept. 26.—Several of the horses were still so much exhausted by the sea voyage that they could not travel. I therefore selected two of the strongest, and accompanied by Mr. H. Gregory, proceeded to explore the country to the east to ascertain the best route towards the Victoria river. After crossing the running brooks seen yesterday, we kept to the north of the previous track. The country was timbered with Eucalypti and Cypress, Pandanus and Cycas frequent; the soil was sand and ironstone gravel producing coarse grass in the wet season, but which was now dried up or burnt by the bush fires. After following a native path for three hours, at 11 A.M. came to a deep pool in the rocky bed of a small watercourse, in which we first observed the Nymphæa. At noon entered a large plain extending south to "Fossil Summit." Crossing the plain, we passed a shallow swamp in which a flock of ibis were feeding, and at 12.30 crossed a mangrove creek,



with a small stream of fresh water, the tide being at the ebb; we then traversed a level forest till 1-15, when we halted at a dry watercourse, in which was a native well 4 feet deep. At 3 again proceeded, and traversed the forest for one hour, and then emerged into a level plain destitute of trees, and apparently extending to "Table Hill." At 4-40 halted at a small swamp, supplied by a spring. The soil of the plain was stiff clay, and at this season of the year very little grass remained. Large flocks of white cockatoos came to drink at the swamp, and we shot two, but had great difficulty in finding them, as they fell into the dense thicket of reeds and melaleuca with which the swamp was overgrown.

*Sept. 27.*—Our horses having strayed about a mile, we did not start till 6-20 A.M., and then steered E. by N. to a swamp at the edge of the plain, and reached it at 7. Here we found a fine mound spring, with abundance of green grass around. A dry tea-tree swamp bounded this portion of the plain to the north. Having found a suitable spot to which the camp could be advanced, we returned towards Providence Hill. As we approached the mangrove creek we observed about ten blacks following our outward track, but on seeing us approach they hastily retreated into the swamp. The water in the creek was now salt, the tide being high, and our horses had some difficulty in crossing, as the bottom was very soft and boggy. At 11 A.M. halted at the rocky pool to rest the horses. At 1-30 resumed our route, and reached the camp at 5 P.M. One of the horses, "Sykes," had become so weak that he could not stand, and there was no hope that he could recover. Bowman had followed the track of "Logan" several miles, but the horse had gone into a dense brush, where the track was lost. This horse had been landed on the 18th, and had escaped into the bush, and though seen several times afterwards, we were unable to secure him, or even drive him to the water; nor would he follow the other horses, and from the frantic way in which he moved about it was evident that the horse was suffering from a species of madness.

*Sept. 28.*—Collecting the horses and saddling them for the first start occupied so much time, that we did not leave our camp till 11 A.M. We then followed the line of route examined yesterday. After travelling 2 m. the sheep could go no farther, and they were carried on horseback to the first brook and there left, as they were not worth carriage. Many of the horses were so weak that they fell down and had to be lifted up, as they had not strength to rise. Continued our route till 5 P.M. and encamped in a grassy flat, 1 m. beyond the rocky water hole, where we halted yesterday at noon. The original number of horses embarked at Morceton Bay was 50; they are now reduced to 41, 3 of which are so much

reduced in strength that there is little hope that they will be capable of crossing the ranges of hills which intervene between this place and the Victoria River, above Sea Range. The following is a list of the casualties :—

1. Polly .. .. Died on the voyage.
2. Saxon .. .. Ditto.
3. Nancy .. .. Drowned in landing.
4. Barney .. .. Ditto.
5. Toby .. .. Ditto.
6. Peter .. .. Lost in the mud in landing.
7. Belt .. .. Died on shore of exhaustion.
8. Logan .. .. Escaped into the bush.
9. Sykes .. .. Left in a dying state at last camp.

*Sept. 29.*—Started from the camp at 8 A.M. and reached the Mangrove Creek at 9 ; but being high water, could not cross the horses till 12.30, when we bridged over the muddy channel with branches. We then followed the edge of the plain, avoided the forest before traversed, and reached the swamp, where we had bivouacked on the 26th, and having watered the horses, went on to the Mound Spring and encamped at 4 P.M. I then, with Mr. H. Gregory, rode to the E.N.E. for an hour, and found a fine creek with large water holes and good grassy flats on its banks. Returned to the camp, which we reached after sunset.

*Sept. 30.*—Started at 8 A.M. and followed a native path to the creek, from which we steered an easterly course. At noon crossed a small salt-water creek, in which some of the horses got bogged. This creek was in the centre of a wide grassy plain ; the grass had, however, been burnt off. At 1.5 passed a dry native well at the edge of the plain, and then entered a sandy forest. At 1.50 came to a reedy swamp, of several acres in extent, and shortly after reached the foot of the MacAdam Range, when it was ascertained that Dr. Mueller, whose botanical researches often detained him in the rear of the party, had missed the track of the horses near the reedy swamp. I therefore ordered the party to return to that place and commence a search for the Doctor, who fortunately was met about half a mile from the spot ; but having lost so much time that we could not continue the journey, we encamped at the swamp at 3 P.M.

*October 1.*—Accompanied by Mr. H. Gregory, left the camp to search for a practicable line of route by which the party could cross the MacAdam Range ; but after proceeding about a mile we shot an emu, with which we returned to the camp, and again started at 7.10 A.M. Pursuing a S.E. course, crossed a stony ridge, and at 8 came to a creek 20 yards wide, with good pools of water and grassy banks, but the country generally barren and stony. After several unsuccessful attempts, we ascended the hills to the S.E. of the creek, and traversed a very broken country of

sandstone formation till 11, when we reached the head of a creek trending southwards. This was followed down till 1, when we halted for an hour and again proceeded till 4:30, the country being very poor and rising into rocky hills on both banks of the creek. We then entered a wide grassy flat destitute of trees, extending 6 m. N. to S. and 15 m. E. to W. On the S. side there appeared to be a creek or river, which we supposed to be the Fitzmaurice River. This plain was bounded on all sides by steep rocky hills of sandstone, of barren aspect. Returned up the creek till 6 P.M. and halted for the night. The day was hot and sultry, though a thunder shower at 2 P.M. somewhat reduced the temperature. The MacAdam Range is of sandstone formation, the strata dipping  $30^{\circ}$  to the S., in which direction, as we advanced, the rock was more slaty and broke into rhomboidal fragments. Water is abundant in the creeks, but grass is scanty, and the rough surface of the sandstone and deep rocky ravines render the country difficult to traverse. Timber is scarce, consisting chiefly of small-sized eucalypti. The cotton-tree was observed in some of the valleys.

Oct. 2.—Returning to the camp we attempted to follow one of the creeks down to the plain on the N. side of the range, but found the ravine too steep and rocky for the horses to pass, and were, therefore, compelled to retrace our steps and cross several steep and rocky hills, reaching the camp at 2 P.M., at which time the thermometer stood at  $94^{\circ}$  in the shade and  $114^{\circ}$  in the sun.

Oct. 3.—Three of the horses had strayed, and this delayed us till 11 A.M., when I started with the party, leaving Mr. H. Gregory and Bowman to search for the missing animals. Proceeding in a S.E. direction to the crossing of the first creek, ascended the MacAdam Range and steered E.S.E. to the second creek; the course was then N.E. and E. to the head of the creek tributary to the Fitzmaurice, and at 3:45 encamped.—(Camp, lat.  $14^{\circ} 33' 35''$ .) At the highest point on this day's journey the aneroid stood at 29:45 and at the camp 29:55, thermometer  $88^{\circ}$ . The highest part of the range did not rise 100 ft. above the ridge crossed.

Oct. 4.—At 10 A.M. Mr. H. Gregory and Bowman reached the camp with one of the missing horses, and having obtained some provisions, returned to search for the other two horses. At noon started with the party and followed down the creek in a S.S.E. direction till 4 P.M., and encamped at the termination of the hilly country.—(Camp, lat.  $14^{\circ} 39' 35''$ .) One of the horses, Madman, showed signs of illness shortly before we started, and in crossing the dry creek, about a mile above the camp, fell down, and in less than three minutes was dead. This was a serious loss, as it was one of the most serviceable of our horses, having suffered but little from the effect of the sea voyage. The cause of death could not

be ascertained; but it is probable that some poisonous plant exists at the place where we encamped last night.

*Oct. 5.*—This morning I started with Dean to examine the country to the E. After traversing the plain for 2 hours, came to a running stream 10 yards wide, but the current very slow. The vegetation on its banks was very luxuriant, presenting a striking contrast to the surrounding country. Followed this brook to the E. and S. for  $1\frac{1}{2}$  m., when it changed to a salt creek, joining the Fitzmaurice River. We then steered S.E. to a remarkable detached hill, which consisted of the same hard fine-grained sandstone as the ranges near the camp. The course was then N.E. and E. for 3 m. along a salt-water creek. At the termination of the salt water, we saw four natives digging roots; on observing us they decamped. We now steered S.E. to a range of rocky hills, which we could not ascend with the horses, from their steep and rocky character; then steered N.W. to a patch of green bushes in the plain, and at 2 m. reached a small lagoon, 200 yards long and 30 wide, on which were many ducks and other water-fowl. Here we halted for  $1\frac{1}{2}$  hours, and then by a N.W. and W. course returned to the camp, passing through grassy plains and patches of forest. Reached the camp at 8.30.

*Oct. 6.*—Started at 8.10 A.M. with the whole party and steered E. to the running brook, which was crossed at the head of the salt water; then proceeding up the stream  $\frac{3}{4}$  m., encamped.—(*Camp*, lat.  $14^{\circ} 40' 4''$ .) Near the brook we saw a native man and two women, who were much alarmed at our sudden appearance, and retreated across the plain.

*Oct. 7.*—At 8 A.M. steered an easterly course, crossing the grassy plain, and passed a low stony ridge, thinly wooded with small trees. At 9.40 crossed a deep water-course, with water-holes and grassy flats. At 10.15 came to a second water-course, which we followed up to the E.N.E. till 11.20, when we halted at a small patch of grass. At 1 P.M. I rode to the N. and E. to look for a more suitable spot for the camp, and having found a grassy flat and good pool of water  $1\frac{1}{2}$  m. higher up the creek, the party moved to it at 4 P.M.

*Oct. 8.*—Taking Dean with me, I rode to the S. of the camp to ascertain the best ascent of the rocky hills which bounded the plain. Following a small valley into the hills, after 2 hours' ride, came to a creek trending to the S., the valley of which afforded a practicable line of route; we therefore returned to the camp at noon. At 3 P.M. started with the party and moved the camp to the creek found in the morning.

*Oct. 9.*—Started at 8 A.M., accompanied by Dean, and followed the creek through a rocky valley between sandstone ranges, the strata of which dip to the W. at a high angle,  $30^{\circ}$  to  $40^{\circ}$ . At 10.15

came to the tide-waters of the creek, and after crossing several stony ridges which came to its banks, at 11:30 came to a small running stream, with a patch of good grass. Here we halted for 2 hours and then returned to the camp, which was reached at 5 P.M. Mr. H. Gregory had returned with the two stray horses, having found them about 10 m. to the N.W. of the camp, at the reedy swamp from which they had strayed.

Oct. 10.—At 7:50 A.M. started with the party and followed down the creek to the head of the salt water, and then by a circuit among the rocky hills reached the running stream, and encamped at 11. I then started in a southerly direction with Mr. H. Gregory, and, after an hour's ride, arrived at the Fitzmaurice River, which here varied from 100 to 300 yards in width, the general course nearly E. and W. The channel was full of banks and rocks, which are dry at low water; the rise of the tide nearly 20 ft. The hills which bounded the valley of the creek we had descended terminated in an abrupt rocky ridge, which left no passage between it and the river; we therefore returned about a mile to the N., and after a toilsome ascent of an hour under a scorching sun, crossed the ridge and halted at a small spring till 2 P.M., when we proceeded up the river, crossing two dry creeks, and after a fruitless search for a suitable spot for a camp, there being no fresh water, we turned towards the camp, but could not cross the range, as we everywhere encountered steep rocks and ravines, and were glad to extricate ourselves from the hills at 9 P.M., when we bivouacked in a grassy flat.

Oct. 11.—Resumed the attempt to cross the range, and, after some search, found a practicable route for the pack-horses; passing a small spring at 7, and reached the camp at 8 A.M. During our absence one of the best pack animals had died, apparently from poison. At 2 P.M. the party started to cross the range, but one of the horses, Drummer, was so weak that he fell several times, and we were at last compelled to abandon him. Having crossed the hills to the Fitzmaurice River, we followed up the valley and halted at a salt creek, 7 to 8 yards wide, there being a little green grass on the banks.—(*Camp*, lat. 14° 47' 18".)

Oct. 12.—During the night the horses were several times disturbed, but it was not till morning that the cause was ascertained, when we found that they had been attacked by the alligators, and three were severely bitten and scratched. At 8 A.M. started to follow up the river, but the rocky hills approached so close to its banks that there was no passage, and we had to ascend the range, which was no easy task. After 3 hours' severe toil, reached a more practicable country, and at 3:30 encamped on the bank of the river above the influence of the tide, the fresh water forming rapids between fine reaches of water, 50 yards wide.—(*Camp*, lat.

14° 51' 37".) Two of the horses had been left about a mile from the camp quite exhausted, but at sunset were brought to the camp.

Oct. 13.—At 7 A.M. crossed to the left bank of the river at a stony bar, where the water formed a rapid 20 yards wide and 2 ft. deep; then following the river up for half an hour, and altered the course to s.s.e. At 8.5 crossed a running stream from the w. At 10.30 two of the horses were completely exhausted, but having rested them at a pool of water, one revived; we were compelled to leave the other. We then proceeded, but were obliged to return to the creek a mile farther up, as several of the horses began to fail, and though we rested till 3 P.M., the second horse was unable to continue, and was therefore abandoned. Since these horses were landed they have not had strength to rise without assistance, and it has been necessary to watch them while feeding, as they often fell down from exhaustion. Continuing our route, the valley was about 2 m. wide, with flat-topped hills bounding it on the E. and W. There were a few pools of water in the creek; but the country was poor and stony, with a few patches of grass. At 5 P.M. encamped. (*Camp*, lat. 15° 1' 10".)

Oct. 14.—Started at 6.30 and pursued a s. course till 8, when we crossed the ridge at the head of the creek and descended some stony gullies to the s.w., and at 10.40 halted at a small water-hole in a creek till 3 P.M., when we recommenced the journey, and followed a valley to the s.e.; but finding the country in that direction unsuited for our object, turned to the w. and reached the creek again at 5.15, and at 6 encamped. There was abundance of water in the creek, and the rank growth of the grass on the immediate banks proved a great impediment to the horses. The back country was, however, very poor and stony, thinly timbered with white gum (*Eucalyptus*), of small size and nearly destitute of leaves; and though the whole country is grassy, it was so much parched up by the intense heat of the sun, that it presented a very barren aspect. At 4.30 there was a heavy thunder shower. As the creek below the camp turned to the w. and entered a deep rocky gorge in the sandstone range, we steered s. at 7 A.M., crossing several stony ridges, with small gullies and creeks trending w. At 10.20 crossed the highest ridge and observed a succession of low stony ridges occupying the space between us and Sea Range. Descending we reached a creek, on the bank of which we halted at 11.30. Here we caught several small fish in a deep pool in the creek. Resuming our route down the creek at 2.30, the average course was s.w. till 5.30, when we encamped at a large deep pool or reach of water,  $\frac{3}{4}$  m. long and 50 yards wide, supplied by a small stream. Great numbers of large bats were seen hanging in the trees on the margin of the creek, some of which we shot; their

flesh was white, but it had an unpleasant flavour. The country during this day's journey has not been so hilly as yesterday, and near the camp the trees have retained a few leaves; the soil, however, shows no improvement, being universally stony, and though well grassed, is useless for any other purpose than feeding stock. The gouty stem tree (*Adansonia*) is more frequent on the banks of the creeks, and fig-trees prevail near the water, and Eucalypti on the hills.

Oct. 16.—Resumed our journey down the creek at 7 A.M., the general course s.s.w. The country became so steep and rocky, that at 8 we left the valley and steered s., crossing several stony hills with rocky ravines between, which were so rugged that they were scarcely passable. At 11 sighted the Victoria River, about 6 miles below Kangaroo Point; but on attempting to descend the range were intercepted by a deep valley, bounded by sandstone cliffs 50 to 100 ft. high. Following the valley to the E. and N.E., in search of a break by which we could descend, without success, at 3 P.M. one of the horses was so completely exhausted that he could proceed no farther. I therefore halted the party, and was examining the cliff to ascertain the best place for lowering one of the party by a rope into the valley for the purpose of procuring water from a pool which was visible 300 ft. below us, when I found a small spring on the top of the cliff, at which we encamped. As soon as the horses were unsaddled, Mr. H. Gregory and myself proceeded to examine the valley to the E., but had not gone more than a mile when we observed a column of smoke rise from the camp, followed by a sheet of flame, which extended up the side of the adjacent hill. We therefore returned to the camp to subdue the fire, and, if possible, save some of the grass for the horses, which, with great difficulty, we succeeded in doing; but, though checked, the fire had extended many miles over the country, and kept us busy all night. This fire originated in a want of due precaution in clearing the grass around the fire at the camp, though the cook had been cautioned on the subject.

Oct. 17.—At 5 A.M. left the camp with Mr. H. Gregory, and recommenced the search for a practicable descent into the valley, and about 2 m. from the camp found a break in the cliff. The hill was so steep and rocky that it was necessary to form a path for the horses, and while Mr. H. Gregory returned and was bringing the party from the camp, I employed myself in filling up the chasms with stones and removing rocks from the path, the steepness of the declivity greatly facilitating their removal, as it required but little force to hurl rock of several tons weight into the valley below. Fortunately we accomplished the descent without any accident, and reached the base of the hill at 10.30 A.M. Descending the creek which occupied the lower part of the valley for about 2 m.

encamped at a small pool of water. I then rode to the bank of the Victoria River, and ascertained that we were about 6 m. below Kangaroo Point. Returning to the camp procured fresh horses, and, accompanied by Mr. H. Gregory, proceeded to Kangaroo Point, reaching the spot appointed for leaving a notice of the movements of the party on board the schooner just as it became dark, and though we found a small tree notched with an axe, there was nothing to guide us in a farther search, and therefore bivouacked.

*Oct. 18.*—At daybreak recommenced our search for some memorandum for our guidance to the camp or vessel, but only found five or six small trees cut with an iron axe, and the remains of a large fire. As it was doubtful whether the vessel had proceeded up the river, I decided on continuing our route in that direction to some convenient spot for a camp near Steep Head, and accordingly returned to the party. The southern face of Sea Range is very abrupt, and surmounted by a cliff of red sandstone, 50 to 100 ft. high, the range being the edge of an elevated table-land. The upper stratum is hard sandstone, in horizontal beds resting on soft shales, which appear somewhat inclined; but the outcrop was so completely covered with fragments of the upper rocks, that no satisfactory data could be obtained. The soil of the level land between the Victoria and Sea Range is very poor, either sandy or covered with fragments of rock; there is no fresh water, and the grass is very coarse. Large flights of cockatoos came to drink at the pools near the camp, and about 50 were shot during the day.

*Oct. 19.*—Started at 7 A.M. and followed the river up to Kangaroo Point, and then by an easterly course ascended the salt-water creek which joins the Victoria at this point. At 4 P.M. reached the termination of the salt water, beyond which the creek divided into several dry channels; in one of them there was a small pool of fresh water, at which we encamped at 4.15 P.M. The result of our shooting this day was 1 turkey, 1 hawk, and 29 cockatoos. The country near the creek is well grassed, the soil a brown loam; but as it approaches the hills the ground is very stony and very thinly wooded with Eucalypti, which were nearly destitute of foliage. To the s. of the creek the country appeared to be of somewhat better character.

*Oct. 20.*—At 7 A.M. steered N. 160° E. m. till 10 over a level grassy plain, wooded with small Eucalypti and Melaleuca trees, the soil varying from brown loam to a stony clay. Altering the course to 190°, passed some low stony ridges, and at 11.30 halted in a dry gully to rest the horses during the heat of the day. At 3 P.M. again started, and proceeding s.w. for half an hour, camped at a small water-hole in a sandy creek. At 4 P.M. I left the camp with Mr. H. Gregory, proceeded to the w.s.w., reached the bank of the Victoria at 5.45, and followed it upwards for half an



hour, when we observed a tent and boat on the opposite side of the river. Having hobbled the horses, we crossed over to the camp, which was established at a small spring, Mr. Elsey and two of the men being in charge. Mr. Elsey informed me that the schooner had grounded on the banks below Mosquito Flat, and had received considerable damage. Fourteen of the sheep had been brought up to the camp, and the boat was expected up that evening with another lot of sheep. I now ascertained that a bottle had been buried near the marked trees at Kangaroo Point, and a pencil mark made on one of the trees to indicate its position; but this mark had escaped observation. In the evening Messrs. Baines and Flood, with one man, arrived in the long boat with 12 sheep, having lost several on the passage up the river in consequence of detention on the shoals near the Dome. The whole stock of provisions at the camp consisted of 10 lbs. pork, 10 lbs. flour, 6 lbs. sugar, and 12 lbs. beef. I was, therefore, unable to send the required supplies to the party in charge of the horses, and the sheep were too poor to be fit for food. The *Tom Tough* reached Entrance Island Sept. 25, and the next day anchored off Rugged Ridge. On the 27th, in proceeding up the river, grounded on a ledge of rocks on the south side of the river, about 6 m. below Mosquito Flat. From the time of getting on the rocks she had leaked considerably, and a large quantity of stores had been destroyed or damaged, there having been 4 ft. water in the hold; but, by nailing battens and blankets over the open seams, the leaks had been greatly reduced. Although the vessel had been got off the rocks, she had not been sufficiently afloat to be under perfect control, but had been gradually drifted up the river to within  $2\frac{1}{2}$  m. of Curiosity Peak. The stock of water on board the schooner being exhausted during her detention, Mr. Wilson had sent the boat up the river to Palm Island to bring down a supply of fresh water, but, having miscalculated the time requisite for this purpose (the distance being 60 miles), the sheep had been kept for several days without a sufficient supply of water, and a great number had perished.

Oct. 21.—Proceeded down the river, with Messrs. Baines and Flood, in the longboat; the tide being unfavourable, we only reached Kangaroo Point.

Oct. 22.—Started at 2 A.M., and reached the *Tom Tough* at 11 A.M., having been delayed by the flood-tide. The vessel had not moved during the four preceding tides, and the leaks had been somewhat reduced. She was so deeply bedded in the sand that, though the bank was dry at three-quarter ebb, I could not examine her bottom; the deck-beams, however, were strained and broken, and it was evident that the vessel had been much damaged by resting on her centre when the current had worked

deep holes at the head and stern. Only 55 sheep remained on board, and those in a miserable condition. At 5 P.M. despatched Mr. Flood in the gig, with a month's provisions for the party at the camp. 8 P.M., the tide rose to 5 ft. on the bank, but the schooner only just floated in the hollow in which she lay.

*Oct. 23.*—At 8 A.M. the tide rose to 6 ft. on the bank, and the vessel was moved her own length towards the channel, and when the tide ebbed at 10, settled on an even keel. The night tide did not rise so high as in the daytime. Landed to search for fresh water, and found a small spring on the bank of the river at the upper end of the stony beach  $3\frac{1}{2}$  m. below Curiosity Peak. This spring is covered at high-water, but at half-tide boats can come alongside, as there is deep water close to the bank.

*Oct. 24.*—Landed at 2 A.M. to procure water, and, having opened a well at the spring, filled two casks, and returned to the vessel at 7. At 9.30 the schooner floated, and we moved her to about 1 m. above Curiosity Peak, where she again grounded on a bank. While afloat, the pumps had to be kept constantly at work. With the night tide the vessel floated over the bank, but, the breeze failing, she was swept against the shore  $2\frac{1}{2}$  m. above Curiosity Peak, and before the kedge could be got out the tide fell.

*Oct. 25.*—The morning tide did not rise sufficiently to allow us to cross the banks, but the schooner was warped into a better position about a mile higher up the river. Landed the sheep, and drove such as could walk to the waterhole 1 m. north of the Dome, and left a party in charge, consisting of Mr. Wilson, Dr. Mueller, Overseer Humphery, and Selby. 50 sheep were landed, but only 44 reached the waterhole, and one of these died in the night. The night-tide rose 8 feet, and the schooner was moved to the right bank of the river, off Broken Hill, and anchored in the channel. Before the full moon the tides have been highest during the day, but, as the full moon approaches, the night-tide rises higher.

*Oct. 26.*—At 10 A.M. the vessel floated, and was moved about 3 m. to the commencement of the reach below Kangaroo Point, where she again grounded. Proceeded with Mr. Baines, in the gig, to the sheep-camp, for the purpose of moving the sheep across the river, but found them so weak that this arrangement was not practicable, and I therefore returned to the schooner.

*Oct. 27.*—At 3 A.M. the vessel floated, and she was moved about a mile above Kangaroo Point, and anchored in  $3\frac{1}{2}$  fathoms. At noon weighed, with a light breeze from W. and N.; but a thunder-squall from the S.E. obliged us to come to anchor 1 m. below Sandy Island, when a change of wind enabled us to move to the island.

*Oct. 28.*—At 2 A.M. weighed, and towed the schooner to the upper end of the spit off Sandy Island, when she grounded, but was warped off at 4. The wind and tide were now adverse, and we anchored in 2 fathom. There is 2 fathom in the channel past Sandy Island, but a reef of rocks extend from the left bank of the river, which renders it necessary to keep close to the shoal off the island.

*Oct. 29.*—At 2 A.M. weighed with the flood and towed up the river about 4 m. At 6.30 a light northerly breeze enabled us to stem the tide, and at 9.40 the schooner was moored at the camp, in 2 fathom close to the bank. Having obtained a supply of water, I despatched Mr. Baines, in the longboat, to bring up the sheep, the gig also going down to bring up the kedge and warp from Alligator Island, and then to assist in bringing up the sheep. In the evening there was a fine easterly breeze, and the thermometer fell to 65° during the night. A few days before our arrival, one of the kangaroo dogs had been seized by an alligator and instantly devoured. The horses had been brought to the camp by the ford at Steep Head, and were looking well.

*Oct. 30.*—Commenced the erection of a shed to protect the stores, as it is necessary to land the cargo of the schooner to effect repairs. The keelson is broken 7 ft. before the mainmast, three of the deck-beams are broken in the centre, and the knees are strained and the bolts drawn. There is also reason to think that some of the floor-timbers are fractured, and also some of the timbers at the bends.

*Oct. 31.*—Messrs. Wilson, Baines, and Mueller, with the party in charge of the sheep, arrived at 7 A.M., bringing the remains of the sheep, 26 in number, 11 having been drowned by the sinking of the boat. Such of the party as are not otherwise engaged are employed in erecting the store-shed. Being desirous to examine the river above Steep Head, commenced fitting the portable boat, but found that the heat of the climate had destroyed the seams of three of the air-cells, and the boat is therefore unserviceable. The general character of the material of which inflated boats are constructed precludes any effectual repairs, as the heat of the sun decomposes the varnish with which the canvas is covered; it first becomes soft and adhesive, and changes to a substance like tar, which does not consolidate with a lower temperature.

*November 1.*—Several of the sheep escaped from the fold last night: some have been found, but 8 are missing. Landing maize, bran, and other stores from the schooner. Though the thermometer stood at 100° in the shade, the westerly breeze rendered it comparatively cool. Mr. Baines repairing the port-

able boat. Richards clearing a piece of ground for a garden near the spring.

Nov. 2.—Continued to discharge cargo from the schooner. At the request of the master of the *Tom Tough*, examined 16 small and 4 large casks of bread, which had been damaged by salt water. The whole of this bread was found to be totally destroyed and unfit for use. Although the large casks had been carefully coopered before leaving Sydney, yet the hot climate had opened the joints, and as there was 3 ft. water in the hold of the vessel when aground on the banks in the lower part of the river, the bread was completely saturated. The leakage of the schooner has been much reduced, and now only requires pumping every six hours. The dryness of the atmosphere has increased from  $10^{\circ}$  to  $20^{\circ}$  of evaporation, and the heat is not so oppressive, though the mean temperature exceeds  $85^{\circ}$ . Heavy thunder-clouds are visible on the horizon, and lightning is frequent in the evenings, especially to the E. Since the spring-tides the river has gradually fallen, and is now 4 ft. lower than the low-water at full and change, and it does not vary more than  $1\frac{1}{2}$  ft. in the 24 hours. A small spring has been found below the high-water mark, close to the landing-place.

Nov. 3.—Completed thatching the store. Continued landing the stores from the schooner, coopering the flour-barrels, &c. Towards evening there was a strong breeze from the N., which suddenly veered to the W., with thunder and a little rain. The sheep are visibly gaining flesh, and the horses have improved, but they are still unfit for work, the grass being very dry, and not in a state to fatten animals.

Nov. 4.—Sunday. The sky was overcast in the afternoon, with a strong N.W. breeze, and every indication of approaching rain.

Nov. 5.—Landing stores from the schooner. General duties. A light shower in the afternoon, and the evening cloudy. By observed altitudes on the meridian, the latitude of the camp is  $15^{\circ} 34' 30''$  S.

Nov. 6.—Messrs. H. Gregory, Elsey, and Mueller, with the master of the schooner and two men, proceeded up the river in the gig, to ascertain the most convenient spot for procuring the timber for the repair of the vessel. Men variously employed coopering casks, fencing the garden, &c. Towards evening the sky was overcast, and there was a slight shower of rain at 4 P.M. The thermometer varying from  $85^{\circ}$  to  $100^{\circ}$ . Wet bulb, 73. Barometer, 29.90. Mosquitos are very numerous in the evening. Received from Mr. Wilson a copy of his journal while in charge of the party on board the *Tom Tough* ascending the Victoria River. Henry Richards, in going to the well, fell among the

reeds, and a splinter entered his wrist, passing under the skin for  $1\frac{1}{2}$  inches, but no material injury has occurred, though it will disable him for a few days.

Nov. 7.—Men employed coopering flour-casks, fencing the garden, completing the store, and camp duties. The party which went up the river yesterday in search of timber for the repair of the schooner returned in the evening, having found some suitable melaleuca trees on the bank of the creek below Steep Head. The afternoon was again cloudy, with much lightning at night.

Nov. 8.—Men employed clearing away the grass and bushes near the camp. Landing stores from the schooner. Plotting route from Point Pearce to the Victoria River.

Nov. 9.—Party employed as before.

Nov. 10.—Party employed as before. On repacking the rice and peas, found that 720 lbs. of rice and half a bushel of the latter were destroyed by salt water, and much more damaged. A great portion of the sugar is damaged, but, as it is not prudent to open the casks, the quantity lost cannot be ascertained.

Nov. 11.—Sunday.

Nov. 12.—Mr. H. Gregory, with Shewell and Dawson, accompanied Captain Gourlay to Steep Head, to cut timber for the repairs of the schooner. Erected the forge, and continued the preparation of the garden, &c.

Nov. 13.—Mr. Baines having succeeded in repairing the portable boat, I made preparations for an excursion up the river, as the horses were still unfit for the work of exploration, and I hoped to be able to cross the shallows which had obstructed Captain Stokes. Richards's arm does not progress in a favourable manner, and it is therefore necessary that Mr. Elsey should remain at the camp to attend to his case. The party proceeding up the river in the boats will consist of Mr. Wilson, Mr. Baines, Mr. Flood, and myself. The men employed as before and the general duties of the camp.

Nov. 14.—Party employed as before. At 3.30 I left the camp and rode to the creek where the timber party were at work, reaching their bivouac at 7.30. Six logs had been cut, 20 to 25 ft. long, and 12 to 14 inches square. The timber is melaleuca, with a broad leaf (*Melaleuca leucodendron*). The gum timber is usually unsound and worthless.

Nov. 15.—Returned, with Mr. H. Gregory, to the camp at 11, and at 2 started, in the Indian rubber boat, with Messrs. Wilson, Baines, and Flood. At 8 p.m. reached the creek near Steep Head, and remained at the camp of the timber party for the night.

Nov. 16.—Started at 6.30 and crossed the shallows at Steep Head without much difficulty, as the tide was high and the water

6 to 8 inches deep. 3 m. above Steep Head we saw three natives watching us, but they did not approach. At 10 A.M. reached "Palm Island," which is only a bank of shingle, with a few pandanus and melaleuca trees growing on it, without a single palm-tree of any kind. One of the boats having been injured, hauled it up for repair. Mr. Baines shot three ducks on the island. While at our dinner a native approached the bank of the river and called to us, and a parley commenced which was rather unintelligible, and when he found that he could not make himself understood by words, resorted to the language of signs and expressed his contempt in an unmistakeable manner. Having repaired the leak in the boat, we again moved up the river, but at  $1\frac{1}{2}$  m. came to a dry bar of rocks, over which the boats were carried, and we passed a shallow pool of brackish water  $\frac{1}{2}$  m. long, to a second bar of greater breadth, and then entered a deep reach, but the day was so far advanced that we took advantage of a level rocky ledge and encamped.

Nov. 17.—Proceeded up the river about a mile, and came to a dry bank of shingle and rocks, extending at least a mile, and over which it was not practicable to carry the boats, they having been much injured in crossing the rocky bars yesterday, the heat of the sun having destroyed the texture of the waterproof canvas. I therefore decided not to expend any more time on this excursion, but return to the camp. Observed some blacks watching us from the thick scrub, but they did not approach near enough to hold any communication. At 2 P.M. commenced the return down the river, and reached Palm Island after dark.

Nov. 18.—At 3 A.M. there was a slight shower of rain. At 6 proceeded down the river, and having dragged the boats over the shingle bank at Steep Head, which was now nearly dry, reached the creek where the timber was cut, and halted to procure fresh water, and then sailed down the river, encountering a heavy thunder squall as we approached the camp; the rain continuing throughout the night. Capt. Gourlay informed me that on the 16th three blacks had visited the party while cutting timber; and that in the evening some sounds had been heard, which being taken for the voices of the blacks, the party had taken to the boat with great precipitation, and returned to the schooner. The mosquitoes have nearly disappeared.

Nov. 19.—Sent a party, consisting of Phibbs, Humphery, Shewell, Dawson, and Selby, to assist the master of the schooner in bringing timber down the river. Richards's arm is somewhat better, but not progressing favourably. Fahey is also on the sick list. The rain having moistened the grass, the horses did not come in for water to-day. The weather continues hot, generally 90° at sunrise and 105° at noon in the shade.

*Nov. 20.*—Commenced shoeing the horses, and made preparations for a journey up the Victoria, to reconnoitre the country previous to starting for the interior.

*Nov. 21.*—Fahey being convalescent is employed as cook. Mr. H. Gregory, Mr. Flood, Bowman, and Melville shoeing horses. Dean burning charcoal for the forge. The flies are very troublesome, and annoy the horses so much that they will not stand quiet to be shod, and some of the horses are nearly blind in consequence of the flies crawling into their eyes.

*Nov. 22.*—Shoeing horses, fitting saddles, &c. The leaks about 7 in. per hour, and, as the master is absent with the greater part of the crew, I have afforded assistance from the party at the camp to keep the vessel dry.

*Nov. 23.*—Preparing equipment for the party proceeding up the Victoria to explore its upper course. The grass is becoming quite green, and water is everywhere abundant, which has caused the horses to stray beyond the usual feeding-ground on Whirlwind Plains.

*Nov. 24.*—Mr. H. Gregory and Mr. Flood brought in the stray horses, having found them below Sandy Island. The timber party returned with four logs of timber which are intended to strengthen the keelson of the schooner. While at work at the creek where the timber was procured, the party had been twice visited by the blacks. These interviews were neither decidedly friendly nor hostile; but they stole some small articles which had been imprudently left lying near one of the logs, while the party were employed elsewhere. About 10 A.M. the blacks set fire to the grass near the camp and then retired. At 2 P.M. left the camp, accompanied by Mr. H. Gregory, Mr. Wilson, and Dr. Mueller, with seven horses and 20 days' provisions, the object being to examine the country through which the exploring party will have to travel on the route to the interior. At 6.0 bivouacked at Timber Creek. (*Camp 1.*) In the principal channel of the creek there were many small pools of water, and the grass was fresh and green on the flats. Except on the banks of the river and creeks, the country is poor and stony; the geological structure of the country is the same as at Sea Range; the same bands of sandstone cliff resting on soft shales, the strata being horizontal; but beneath the shales, chert and a coarse silicious limestone were exposed, and fragments of jasper are frequent. The principal trees are, white gum of small size, box, and *sterculia*. The cotton-tree also is common on the stony ridges. Though grass is abundant on every description of soil, yet the greater part is of inferior quality, and dries up completely at this season.

*Nov. 25.*—Started at 5.45 and followed the creek to the S.E. and S.S.E.; it rapidly decreased in size, branching into several

small gullies, so that we had some difficulty in finding water for our midday halt. The flats on the bank of the creek are in some parts nearly a mile wide, well grassed and openly timbered. The hills are of sandstone, but chert and coarse limestone were frequent on the lower ridges. At noon halted at a small pool of water. The day was cool and cloudy, thermometer  $93^{\circ}$  at 2 P.M. At 3 resumed our journey up the creek, which soon terminated in small gullies rising in stony ridges. As there was no appearance of water existing to the s., the course was changed to s.e. and e., in which direction we followed down a gully, and at 7.20 halted at a small water-hole. (*Camp 2.*)

Nov. 26.—Started at 6.15 A.M. and steered N.  $70^{\circ}$  E. and N.  $60^{\circ}$  E. till 3 P.M., traversing a level grassy box flat extending along the northern side of a rocky sandstone range. At 3 P.M. reached the s.w. end of the Fitzroy Range, which is a narrow ridge of sandstone hills 10 m. long and 1 to 2 m. broad. At the north end of the range we found a small pool of water, and, having watered the horses, pushed on towards the Victoria River at the base of Bynoe Range; but though the country was level, we were so much retarded by the soft nature of the soil, that the river was not reached till sunset. The banks of the river were so steep that the water was inaccessible for the horses, and we therefore encamped at a small muddy pool of rain water. (*Camp 3.*) Our camp was about 4 m. above the farthest point reached by Capt. Stokes, and consequently in Beagle Valley, which we had traversed for more than 30 m., the greater part being well grassed, and openly wooded with box, Bauhinia, and acacia. The Fitzroy Range is almost isolated, and there is a level plain 5 or 6 m. wide to the s.e., beyond which is a sandstone range surmounted by an almost unbroken cliff of sandstone near the summit, which appeared to be impassable.

Nov 27.—Steering E.S.E. through grassy flats for  $1\frac{1}{2}$  hours, found that the river had turned to the northward round a steep hill; but continuing our course crossed a low stony ridge and again approached the river, the banks of which were so steep that the horses could not approach the water, and therefore followed it 2 m., and then encamped on a stony bar, where the water was easy of access. (*Camp 4.*) The valley of the river is much contracted by the steep sandstone hills, which come close to both banks. In the bed of the river several fragments of jasper and black shale were found, the latter appearing to belong to the coal formation. A slight shower cooled the air, and the thermometer was only  $92^{\circ}$  at sunset; the wet bulb  $79^{\circ}$ .

Nov. 28.—Started at 6.15 A.M. and followed the river, first E., then s.e. and s.w. till 10.40, when we crossed to the right bank and halted. The valley of the river is much narrower, and does not



exceed half a mile, and is bounded by cliffs of sandstone from 50 to 300 ft. high. The waters of the river occasionally rise 100 ft., as the marks of floods extend to the base of the cliffs. The regular channel is about 200 ft. wide, and the water forms deep reaches, often more than a mile long, separated by dry bars of shingle or rock. The sandstones are thicker here than at Steep Head, but there is no change in the geological character, except that the chert beds are not exposed. The tracks of several natives were observed, but they were not seen by us. At 2 P.M. resumed the journey up the river in a general s. direction, and at 4.40 encamped, but had great difficulty in forcing our way through the reeds to the water. (*Camp 5.*)

*Nov. 29.*—Left the camp at 6 A.M. and continued the route up the river to the s. till 10.10, halted till 2.15, and then proceeded till 4.45, and encamped at a small pool of rain water, the bank of the river being so steep and thickly covered with reeds that the water was not accessible. (*Camp 6.*) The valley of the river is still bounded by cliffs, but as the strata are horizontal, and the bed of the river rises, the shales are not so much exposed, and the alluvial banks reach to the base of the cliffs, which are so continuous that I have not yet seen a spot where we could have ascended the table land in which the valley is excavated. Several tributary gullies have been passed, but none worthy of special notice. Fragments of trap rock are frequent in the bed of the river, and one specimen showed traces of carbonate of copper. At 6 P.M. thermometer 92°, aneroid 29.80, at the camp 60 ft. above the river.

*Nov. 30.*—Resumed our route up the river at 5.40 A.M., the general course being s. There was no change in the character of the country till 10.0, when the cliffs receded; at 10.30 halted at a small pool in a side channel of the river. At noon the thermometer 100° in the shade, aneroid barometer 29.75, 40 ft. above the bed of the river. Starting at 2 P.M. soon entered an extensive plain extending to the E., s., and w. Followed a large creek to s.w. till 6.15, and encamped. (*Camp 7.*)

*December 1.*—At 5.40 A.M. crossed the creek, and steered E. to the foot of a rocky hill; but not seeing the principal channel of the Victoria, returned to the creek and steered s.s.w. till 10, when we crossed two small creeks, in the second of which we found a pool of water surrounded by reeds (*Typha*), and halted during the heat of the day. The country traversed was first a stony ridge, on which many small stone huts had been erected by the natives; but they are scarcely of sufficient size for a man to enter, and the roofs were only formed by a few pieces of wood and a little grass. They consist of a wall 3 ft. high, in the form of a horseshoe, about 3 ft. in diameter inside; the entrances of some had been closed with

stones and afterwards partially opened ; and I can only conjecture that as the custom of carrying the bones of their deceased relatives prevails in other parts of Australia, it is possible that these erections are used as temporary sepulchres. After crossing this stony ridge, entered a level plain of clay much fissured by the sun, and in some parts covered with fragments of jasper and sandstone. As the creek was approached, limestone prevailed, but the exposed portion of this rock seemed to be formed by a rearrangement of the fragments of the older rock, which was visible in the gullies. The water at which we halted appeared to result from a spring, and not from the retention of rain water. At 3.15 proceeded in a westerly direction in search of the principal branch of the creek, which we reached at 4, but found it much reduced in size, not exceeding 15 yards in width. Followed it up for an hour, and encamped at a small but deep pool of water, which is evidently supplied by a spring in the limestone rock which forms the bank of the creek. (*Camp 8.*)

*Dec. 2.*—Having filled our water bags, we left the creek at 6.40 A.M., and steered a course of N.  $200^{\circ}$  E. towards a range of hills of jasper rock, the highest point of which we reached at 10; the aneroid here stood at 29.15, thermometer  $94^{\circ}$ . 3 m. to the s.w. of this range the country rose into an elevated table land higher than the Jasper Range. Towards this we continued our route, following a small watercourse which gradually turned to the E. As the country was very dry and rocky, and there was no prospect of finding a point where we could ascend the table land, we returned to the waterhole at which we camped last night. (*Camp 8.*)

*Dec. 3.*—At 6 A.M. were again in the saddle, and, steering N. till 7.20, ascended an isolated hill of trap rock, rising abruptly in the open plain about 200 ft. Having taken bearings of the various ranges, steered N.  $30^{\circ}$  E. till 10.30 across a level grassy plain to the creek, which, though much larger than at the camp, was destitute of water; but following it downwards, at 10.50 halted at a shallow pool. Judging from the height that the drift wood was lodged in the branches of the trees, the floods rise about 50 ft. The regular channel is 50 yards wide and sandy, but red and green shales are exposed on the banks. A large tributary seems to join this creek from the w., in which direction there is a considerable valley extending 15 m. At 3 p.m. steered E., and passed to the s. of a remarkable sandstone hill, which was named Mt. Sandiman; and at 5.30 reached the bank of the Victoria coming from the s.s.e.; followed it up for 1 m., and encamped where a ledge of rocks gave easy access to the water. (*Camp 9.*) In the evening there was a slight shower, and a heavy thunderstorm passed to the N.

*Dec. 4.*—At 4.45 resumed our journey up the river, passing

through wide grassy flats, and over a sandstone ridge covered with triodia. From this ridge there was an extensive view of the country to the s. and e., but no hills of greater elevation than the sandstone table-land were visible, and for 20 m. the valley of the river expanded into a wide plain, thinly timbered with box trees. Continuing a s.s.e. course through a fine grassy country, at 10 halted in a patch of green grass. The elevation of this part of the country is not great, as the barometer stood at 29·77 40 ft. above the river; thermometer 101°. The soil on the bank of the river is good and well grassed, but the inundations in the wet season extend more than a mile on each side of the river. The strata of sandstone, where exposed, dip to the n.; but there is no alteration in the character of the rock. Abundance of portulacæa grew near our halting-place, and furnished us with an agreeable vegetable. This plant was afterwards found over the whole of Northern Australia, and proved a very valuable article of food. At 3·30 continued our route, and at 5·30 bivouacked at a small pool of rain water in one of the back channels of the river, the banks of which were inconveniently covered with high reeds. (*Camp 10.*)

*Dec. 5.*—Continued our route up the river to the s.s.w. from 5·45 till 10·45, passing through open grassy box flats. A low grassy range approached the right bank, and then receded. To the w. a range of broken hills rose about 500 ft., parallel to our course and 5 m. distant. Halted in the bed of the river, which formed fine reaches of water with dry sand bars between. Caught several catfish and perch. Mussels are abundant; the shell is much longer in proportion than any before seen in the lower part of the river. At noon barometer 29·80, thermometer 104°; at 3 p.m. barometer 29·65, thermometer 93°. At 3·30 steered s. from the right bank of the river, which turned to the westward; crossed some fine grassy country, thinly timbered with box, and at 4·50 came to a southern branch of the river. This branch trended to the n.e., and consequently joins the river lower down than where we crossed, the junction not having been seen. These two branches of the Victoria are so nearly equal in apparent size, that it will remain for future examination to determine which is to be considered tributary to the other. Crossing to the right bank, we followed it upwards along the foot of the sandstone range for half an hour, and encamped in the bed of the river. (*Camp 11.*)

*Dec. 6.*—The day commenced with a heavy thunder-shower, which continued for several hours; but at 6 a.m., the rain not being quite so heavy, we started and proceeded along the bank of the river to a hill 1½ m. s.w. of the bivouac; ascended the hill, but found the view obscured by the mist and rain: we could, however, see that the country to the s.w. and s. consisted of flat-topped

sandstone hills with large open valleys between them; to the E. the view was obscured by rising ground; while to the N. lay the vast grassy plain we had traversed during the last two days. The western branch of the river turned to the W.S.W. along the foot of the sandstone ranges, its course being marked by a line of green trees which contrasted strongly with the white grass of the open plains on its banks. The south branch of the river appeared to come from a valley trending S.S.E., but the mist obscured that part of the country. As we had now examined the country sufficiently to enable the main party to advance a whole degree of latitude without any great impediment, and ascertained the general character of the country and nature of the obstacles to be encountered, and on which the equipment of the party would in some measure depend, we turned our steps towards the principal camp, crossed the western branch of the river at 9.40, and reached our camp of the 4th at 3.40. Thermometer, 9 A.M.,  $74^{\circ}$ ; 6 P.M.  $84^{\circ}$ .

*Dec. 7.*—Resumed our journey down the river, following the outward track from 5.40 till 11, when we halted till 3.25 P.M. Thermometer at noon  $102^{\circ}$ , wet bulb  $78^{\circ}$ . Resuming our route, crossed to the right bank of the river, and bivouacked at the termination of the plains.

*Dec. 8.*—At 5.45 proceeded down the right bank of the river, which was very rocky and steep; we therefore returned to the left bank, and at 11 halted 1 m. above the bivouac of the 29th ult. Between 2 and 3 P.M. there was a heavy thunder-shower, and  $\frac{1}{4}$  an in. of rain fell. At 3.45 P.M. resumed our journey, and bivouacked about 4 m. lower down the river.

*Dec. 9.*—Followed the left bank of the river from 6 till 11 A.M., found the travelling less stony and interrupted by deep gullies than on the right bank. At 3.30 resumed our route, and at 6.30 encamped.

*Dec. 10.*—Travelled down the river from 5.45 till 10, when we halted  $\frac{1}{4}$  m. above the camp of the 27th ult. At 2 P.M. a heavy shower cooled the air from  $100^{\circ}$  to  $77^{\circ}$ . At 3 resumed our route, and at 6.30 camped on the level plain at the foot of the Fitzroy Range; water being abundant in every hollow, as since we passed up the river there has been heavy rain in this part of the country, and some of the gullies were running in flood 8 ft. deep. Shot a turkey and three black ibis. The Fitzroy Range extends about 2 m. N. of the gorge of the Victoria River, which winds round the range to the N., and some tributary creeks seem to join from that direction, as a valley extends several miles to the northward. The rain does not appear to have been general over the country, as it often occurs that, after travelling over 2 or 3 m. of green grass where the gullies show the signs of recent floods, this beautiful verdure suddenly ceases, and we again encounter a dry and

parched country which exhibits all the signs of an Australian summer.

*Dec. 11.*—Left our camp at 5·45, and steering w. crossed the low ridge of the Fitzroy Range, and, having taken bearings of the features of the country, steered N.  $260^{\circ}$  E. over the level country which occupies the space between Wickham Heights and the Fitzroy Range, and named by Captain Stokes "Beagle Valley." The soil of this plain is a brown clay, which in dry weather crumbles into small pieces, but in the wet season is deep mud: it is, however, very fertile, and produces abundance of high grass. The few trees which exist are Bauhinia, acacia, and small eucalypti. Halting from 10 till 4, changed the course to N.  $245^{\circ}$  E.; and after traversing a grassy box flat for 2 hours, camped at a small watercourse with pools of water in a rocky limestone channel.

*Dec. 12.*—Started at 5·30, and steered N.  $245^{\circ}$  E. for  $1\frac{1}{2}$  hours, when we passed the high bluff of the range and changed the course to N.  $330^{\circ}$  E., keeping  $\frac{3}{4}$  m. to the E. of the remarkable hill called the "Tower" by Captain Stokes, from a rock on the summit. The country was very rough and rocky, though the ridge we passed over was not more than 200 ft. above the river. Continuing a N.N.W. course, at 9·45 reached the bank of the Victoria, which we followed on a course of  $200^{\circ}$  till 10·10, when a large creek joined the river. This creek drains nearly the whole of Beagle Valley, and takes its rise on the N.W. slope of Stokes Range. The course was then westerly till 12·15, when we halted in a grassy flat  $\frac{1}{3}$  m. from the river. Marked a large Adansonia tree " $\frac{1}{2}$ " on the south side.

*Dec. 13.*—Leaving the camp at 5·30 followed the valley of the river, crossing the ridge at back of Steep Head at 10, and halted at Timber Creek at 11. The heavy rains which occurred in Beagle Valley do not appear to have extended to this part of the country, and the grass is still dry and withered. At 2·30 resumed our route and reached the *principal camp* at 6·30, and found the party all well except Richards, who was still suffering severely from the injury to his wrist. Mr. Baines was absent, having started on Wednesday in search of two horses which had strayed to the westward.

*Dec. 14.*—Mr. Baines and Bowman returned with the stray horses, having found them on the banks of a small river 15 m. W. of the camp. This river, which I named the "Baines River," has considerable pools of fresh water in its bed: it comes from the S.W. and flows into the large saltwater creek above Curiosity Peak. On one occasion Mr. Baines and Bowman had halted to rest during the heat of the day, when they observed some blacks creeping towards them in the high grass, but on finding that they were seen, retired, and shortly returned with augmented numbers, and

approached with their spears shipped. Mr. Baines and his companion having mounted their horses, galloped quickly towards them, and the blacks retreated with great precipitation. Mr. H. Gregory brought in the greater part of the horses, but they had scattered so much in search of green grass that many were 10 m. from the camp. Men employed cutting and carrying timber for the repair of the schooner, which work progresses satisfactorily. Computing astronomical observations for latitude, &c.

*Dec. 15.*—Party employed as before. One of the mares is reported to have foaled a fine filly. 'Thunder showers are frequent, and the country near the camp is clothed with verdure.

*Dec. 16.*—Rode out with Mr. H. Gregory and Mr. Baines to bring in some horses which had strayed. After several hours' tracking they were found and brought into the camp. The horses are now much improved, and with the exception of three which are still very weak, are in servicable condition, though few are capable of carrying heavy loads or performing long journeys, but as grass and water are now abundant for the first 100 m. of the route towards the interior, I hope that, by travelling easy stages, the horses will improve. Preparations are therefore being made for commencing the journey early in January. The country being impracticable for drays, and as sheep cannot be driven with advantage, owing to the high grass and reeds, it is necessary to constitute the party so that the whole equipment can be carried by pack-horses, to accomplish which the whole number of the party proceeding to the interior must not exceed nine, for which the horses are capable of conveying five months' provisions and equipment. The remaining half of the party will have full employment in the repair of the schooner and care of the stores, points of vital importance to the expedition. It is therefore proposed to make the following division of the party, which, under existing circumstances, seems to me the most eligible. The exploring party to consist of the following persons:—Commander, A. C. Gregory; Assistant Commander, H. Gregory; Artist, T. Baines; Botanist, F. Mueller; Collector, J. Flood; Overseer, G. Phibbs; Farrier, R. Bowman; Harness-maker, C. Dean; Stockman, J. Fahey.

The party remaining at the principal camp:—Geologist, J. S. Wilson; Surgeon, J. R. Elsey; Overseer, C. Humphery; Stockmen, Dawson, Shewell, Selby, MacDonald, Richards, and Melville.

*Dec. 17.*—Preparing maps of the late excursion up the Victoria River. Shoeing horses and other preparations for the expedition into the interior.

*Dec. 18.*—Party employed as before.

*Dec. 19.*—Removed the bones from the salt pork, which is to

form part of the provisions for the exploring party, the reduction in weight being 17 per cent. Packing flour in canvas bags containing 40 lbs. and 50 lbs. each: in the centre of every bag of flour 1 lb. of gunpowder is placed, as it is the most secure from accidents. Shoeing horses, &c., as before. The weather has been cool and cloudy, and it commenced to rain at 10 P.M., and continued till daybreak.

*Dec. 20.*—Party employed as before. Killed one of the sheep, which weighed 38 lbs. The weather continues showery.

*Dec. 21.*—Preparing for explorations as before. The river has commenced running, but is still brackish; the weather is cloudy with frequent showers, and the country is becoming very soft and boggy.

*Dec. 22.*—Frequent heavy showers, especially at night. Mr. Wilson and Dr. Mueller, with one of the men, went down the river to Sea Range to procure specimens of rocks and plants. The repairs of the schooner requiring some broad iron, I had the iron-work of one of the drays appropriated to the purpose, as there was no iron of a suitable size on board the vessel. Party employed shoeing horses, fitting saddles, and general preparation of equipment of the exploring party.

*Dec. 23.*—Two of the horses have again strayed to the westward, and Mr. H. Gregory and Bowman were employed nearly the whole day in tracking them, and succeeded in bringing them in at night. The river is quite fresh, and running with a current of 1 to 2 m. per hour. Since the commencement of the rainy season the general health of the party has improved, but this is perhaps due to a reduction in the temperature and increased regularity of diet, &c. Richards's arm is, however, in a very unsatisfactory state, resulting more from constitutional causes than the original extent of the injury.

*Dec. 24.*—Preparing equipment as before. Dr. Mueller and Mr. Wilson returned in the boat from Sea Range, and report the river to be fresh at Sandy Island. Frequent heavy showers have rendered the ground so soft that the horses cannot be hobbled without danger of their getting bogged, and it is scarcely possible to ride after them to herd them.

*Dec. 25.*—Christmas-day. Frequent heavy showers throughout the day and night. Killed a sheep, of weight 38½ lbs.

*Dec. 26.*—Continued preparation of equipment. Fitting spare shoes to the horses, &c. Frequent showers.

*Dec. 27.*—Party employed as before. This has been the first fine day during the past week, there having been but one shower during the 24 hours.

*Dec. 28.*—Packing stores, &c. The schooner was moved into the stream, as the drift wood collected in large quantities at her

bows when moored near the bank, and could not easily be cleared away. The water of the river is very muddy, and has risen about 6 ft. above the ordinary high-water mark; the current is 1 to 2 m. per hour. In winding chronometer 2139 the chain broke, in consequence of its being much corroded, and the force of the spring injured it so much that I had to splice it in six places.

*Dec. 29.*—Preparing equipment as before, &c.

*Dec. 30.*—Sunday.

*Dec. 31.*—Preparing tracings of maps, &c. Completed the preparations for the party proceeding to explore the interior.

*January 1, 1856.*—Wrote to Mr. Wilson, enclosing instructions for the guidance of the officer in charge of the principal camp on the Victoria River. Wrote to the master of the *Tom Tough*, giving instructions relative to the repairs and movements of the *Tom Tough*, &c. Having completed the arrangements for the journey into the interior, the horses were saddled and the party on the point of starting, when a gun was fired on board the schooner, and the horses took fright, rushing wildly into the bush, and it was only after a hard gallop of 2 m. that they were turned and driven back to the camp. Many of the saddles were torn off by the horses having run against trees; and as they had scattered very much, it took some time to collect the loads which had fallen from the horses, and four bags of provisions could not be found. A few of the straps of the colonial-made pack-saddles were broken, but no other damage was done to them; the English-made saddle was shaken to pieces. The party were employed in the evening repairing damages.

*Jan. 2.*—Completed the repair of the saddlery, &c., broken yesterday. Two of the missing bags were found, but a heavy shower having obliterated the tracks of the horses, two bags containing sugar and sago were lost.

*Jan 3.*—All arrangements being complete, the party commenced their journey at 11 A.M., and proceeding up the river to Timber Creek, encamped there at 3 P.M. (*Camp 1.*) The following is a memorandum of the arrangement and equipment of the party. The exploring party has with it—27 pack-horses, with pack-saddles; 3 pack-horses, with riding-saddles; 6 riding-horses, or, in all, 36 horses, with flour, 1470 lbs.; pork, 1200 lbs.; rice, 200 lbs.; sago, 44 lbs.; sugar, 280 lbs.; tea, 36 lbs.; coffee, 28 lbs.; tobacco, 21 lbs.; soap, 51 lbs.; or in all, 3330 lbs.; instruments, clothing, tents, ammunition, horse-shoes, tools, &c., 800 lbs.; saddle-bags and packages, 400 lbs.; saddles, bridles, hobbles, &c., 900 lbs.; total, 5430 lbs. The total weight of the equipment of the party was thus about  $2\frac{1}{2}$  tons, which distributed on 30 horses, gave an average load of 180 lbs. each. Each person had a stated number of horses in his special charge, and was



responsible for the proper care of the loads and equipment, the saddles and loads being all marked with corresponding numbers. A watch was constantly kept through the night, each person being on sentry for 2 hours in regular rotation, except myself, as I had to make astronomical observations at uncertain hours. The cook was on watch from 2 till 4 A.M., and having prepared breakfast the party concluded this meal before daybreak, and thus the most valuable part of the day was not lost.

*Jan. 4.*—Started at 7 A.M. and followed up the creek, but Dr. Mueller having wandered away into the rocky hills and lost himself, I halted at the first convenient spot, and despatched several of the party to search for him, but it was not till 4 P.M. that the Doctor reached the camp. (*Camp 2.*) At noon there was a shower of rain which reduced the temperature to  $92^{\circ}$ .

*Jan. 5.*—The day broke with a heavy shower which continued till 7:30, when it was followed by a cool breeze from the w. At 8:35 steered N.  $150^{\circ}$  E. up the valley of the creek till 11, when crossing a low ridge we descended into Beagle Valley, and steering N.  $160^{\circ}$  E. till 2:10 halted at a small creek. (*Camp 3.*) The country is now covered with fine grass, and water is abundant, though the smaller watercourses have ceased to flow. In the evening walked to a hill about a mile s. of the camp: it was only 150 ft. high, but gave a fine view of the distant ranges.

*Jan. 6.*—It rained continuously during the night, with much thunder and lightning. At 8 steered  $160^{\circ}$  and soon came to a small creek with water pandanus growing on its banks: this was followed to the s.s.e. At 11 crossed it, and changed the course to s.e., camping at a small gully at 11:30. I then went with Mr. H. Gregory to look for a practicable ascent of Stokes Range, and having been successful in the search returned to the camp at 6 P.M. (*Camp 4.*) There are few spots where this range can be ascended, as a line of cliffs run along the brow of the hills, varying from 10 to 100 ft. in height. While on the hills we saw a few blacks, but they did not approach. The day was cloudy and cool, and cleared after sunset, which enabled me to get altitudes for latitude.

*Jan. 7.*—The day again commenced with heavy showers, which lasted till 7 A.M. At 7:30 started on a course of  $120^{\circ}$ , and reached the foot of the sandstone range at 8:50, and the summit at 9:30. The table land on the summit being intersected by deep gullies trending to the s.w., we steered E. till 11:40, when we came to a deep valley trending e.s.e. Having made the necessary observations for altitude, commenced the descent of the hills, which were practicable in few places, as the valley was walled in by steep hills, with cliffs of sandstone 20 to 100 ft. high, with only an occasional break. At 1 P.M. reached the bottom of the valley and

encamped at a small gully. (*Camp 5.*) The summit of the range is a nearly level table-land, the undulations not exceeding 100 feet; but it is intersected by deep ravines, with perpendicular sides, which vary from 100 to 600 ft. in depth. The upper stratum of rock is sandstone, and the soil on it very poor and sandy, producing small Eucalypti, Hakea, Grevillia, and a sharp spiny grass (*triodia*), which is the "spinifex" of some Australian explorers. The character of the country is very similar to the interior of some portions of the western coast.

*Jan. 8.*—Heavy rain till 7 A.M. At 7.15 started and followed the valley to the s.s.e. and s. till 9, when it was joined by a larger valley from the w. trending e., and in which a large creek in high flood obstructed our course. As the water was too deep to ford, we fixed a rope to the branch of a tree and passed the packs over the stream. This was accomplished at 3 P.M., and the water having sunk considerably the horses crossed over, and we encamped on the s. side of the creek. (*Camp 6.*) The valleys are well grassed, and vary from  $\frac{1}{4}$  to  $\frac{3}{4}$  m. in width, the hills rising steeply from the base to near the summit, where they are crowned by a cliff 20 to 150 ft. high. The summits are level or nearly so, as the valleys are only deep ravines excavated in the table land. The valley of the larger creek appears to expand about 5 m. to the w. of the camp, and the hills are rounded in their outline.

*Jan. 9.*—A light shower at night was followed by a cool, cloudy morning. At 6.50 followed down the creek to the e. and crossed to the left bank to avoid some rocky ground. On attempting to cross lower down, one of the pack-horses was carried down the stream some distance by the force of the current, and the saddle-bags were recovered  $\frac{1}{4}$  m. below. The valley contracted as we proceeded, and the cliff closed in and left no passage on the left bank, and we had to return  $1\frac{1}{2}$  m. up the creek to cross to the right bank, where our course was again obstructed by a large tributary, which was crossed with difficulty, and then passed through the rocky gorge of the creek, where the cliff came so close to the bank of the creek that there was scarcely room for a horse to pass. At 12.10 camped on the bank of the creek at the termination of the hilly country. (*Camp 7.*) Ascending a rocky hill, obtained a view of the valley of the Victoria, and ascertained that we were on one of the branches of Jasper Creek. The afternoon and night were showery.

*Jan. 10.*—At 6.30 steered s.e., leaving the creek to the n. The country soon changed to a level plain well grassed, but owing to the late rain very soft and muddy. At 10.20 passed the n. end of Jasper Range, and came to a creek 15 yards wide, trending n.e. Having forded the creek encamped on the right bank.

(*Camp 8.*) The soil of the country traversed this day is a good brown loam on the plains, but rough and stony on the hills. The trees are of small size, principally box and Bauhinia. Sandstone is the prevailing rock, sometimes passing into jasper, and also into chert and coarse limestone. Small veins of quartz intersect the jasper, and contain minute crystals of sulphuret of copper and iron.

*Jan. 11.*—One of the mares having foaled in the night, she was not fit for a day's journey: we therefore remained at the camp and employed the day in repair and adjusting saddles and other works of an indispensable nature. Marked a large gum-tree

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*Jan. 12.*—The night was fine, with heavy dew and a light breeze from the s. At 6·15 steered N. 150° E. over the level country which extends along the E. side of Jasper Range. The soil is stony, but well grassed, and the fine weather had allowed the surface of the ground to become firm, so that the horses were not often bogged. At 12·25 camped on a small creek between the Fitzgerald and Jasper Ranges. (*Camp 9.*) Marked a gum-tree at the camp "No. 9." The general character of the country is good and well grassed, and well suited for stock, though not equal to the basaltic country to the E. of the Victoria. Hard sandstone, jasper, and coarse limestone are the prevailing rocks.

*Jan. 13.*—The night was cool and clear, with heavy dew; thermometer 62° at sunrise. Steering an average S. course from 6·40 till 11·25, reached the western branch of the Victoria and encamped. (*Camp 10.*) The country traversed was nearly level, well grassed, and thinly wooded with eucalypti and Bauhinia. The soil brown loam with fragments of limestone. The river was running strong, but not in flood: the greatest rise this season had been 10 ft., and the usual flood-marks are 20 ft. higher.

*Jan. 14.*—Followed the river to the W.S.W., crossing two large creeks from the N.W. Approaching the sandstone range on the western side of the plain, the soil did not improve, but became very sandy. The country is thinly wooded with box-trees and Bauhinia of small size. Grass is abundant and good. At noon one of the pack-horses, "Sam," knocked up, and his load being transferred to one of the riding-horses, he was left to rest while we sought a suitable spot for a camp, and at 12·15 halted at a small gully, as the bank of the river was very soft and unsafe for the horses to approach. (*Camp 11.*) Sent back for the horse "Sam," and he was brought to the camp. Ascended the hill to the N.W. of the camp to take bearings, but no important features of the country were visible. In ascending the hill, the aneroid (B) fell from 29·62 to 28·55, and on descending only rose to 28·80, the

estimated height of the hill being 300 feet. As this indicated a change in the form of the metal, it was readjusted to the aneroid (A) 29.45. The continuance of fine weather and the forward state of the grass lead to the supposition that the wet season has already terminated, though only two months have elapsed since the first rains. It is probable that the wet season is much shorter in the interior than on the coast, and that at no great distance inland the tropical wet season will cease altogether, as Captain Sturt, in latitude  $26^{\circ}$ , only observed a fall of rain in August, though this might be exceptional, as in the case of Leichhardt, who never encountered a wet season during the journey to Port Essington.

*Jan. 15.*—Started at 6.45 and followed the river to the w.s.w. The hills coming close to the bank for some miles caused the progress to be slow and difficult. Crossed two large creeks coming from the w.n.w., the second 70 yards wide. At 10.30 camped in a fine grassy flat. (*Camp 12.*) The course of the river was now more from the south, and the valley expanded into a plain several miles wide.

*Jan. 16.*—As several of the horses required a day's rest, at 6 I started with Mr. H. Gregory to examine the country to the southward, and followed the river through a fine grassy plain till 10, when it entered the sandstone range, and contracted the valley to  $\frac{1}{2}$  a mile. The hills were steep, but the level ground in the valley, except where intersected by gullies, was good travelling. The river is much reduced in size, and the water is confined to the smaller channels in the principal bed. The water is clear, and has not the muddy appearance which characterizes it lower down. The geological character of the rocks is unchanged, but the bed of the river being less deeply excavated, the lower beds of limestone and jasper are not so largely developed; nor are the summits of the hills quite so level, and large blocks of sandstone, the remains of an upper stratum, give the country a very rugged appearance. Returned to the camp at 6.30. In the evening there was a heavy thunder squall with rain from the north, but the weather cleared at midnight.

*Jan. 17.*—Started at 7.5 and steered a s.w. course till 10.30, passing over a level grassy flat the whole distance, but the soil became more sandy as we proceeded up the river. (*Camp 13.*) There is very little wood of any description, and the few trees that exist are a white stemmed Eucalyptus and a tall pinnate leaved Acacia. The horse "Sam" is very weak, and two other horses are lame and can scarcely travel. Since the 3rd instant the distance travelled has not exceeded 10 miles per diem, water and grass are everywhere abundant, and the loads not heavy, yet the greater part of the horses appear unable to perform more work.

*Jan. 18.*—Some of the horses having strayed towards the last

camp, we were detained till 8·10 and then steered south for three miles; the sandstone hills closed in with the river, and scarcely left space to pass at the base of the steep rocks. Here the horse "Sam" fell into a pool of water, and when extricated could not stand: this accident having caused much delay, we encamped  $\frac{1}{2}$  a mile farther on, in a grassy flat. (*Camp 14.*) In the evening sent Bowman and Dean to bring the horse to the camp, but they found him dead.

*Jan. 19.*—The night was fine with heavy dew, the temperature  $73^{\circ}$  at sunrise. Having collected the horses, at 6·45 left the camp and followed the valley of the river on an average s.w. course, crossing a large creek from the n.w. The valley of the river expanded to three miles and then narrowed to one mile, and the course nearly west till 10·50, when we encamped. (*Camp 15.*) The soil of the valley is brown loam, producing abundance of grass; but the hills, though less rocky, are more barren than lower down the river. The character of the channel of the river has altered, and has the appearance of a stream which continues to run late in the season, as the channels are narrow and bordered with Pandanus, Melaleuca, and other trees which grow near permanent water. The banks are of less height, and the timber growing on them has a greater size than lower down the valley. At 1 p.m. the thermometer was  $100^{\circ}$  and the wet bulb  $76^{\circ}$ , showing  $24^{\circ}$  of evaporation.

*Jan. 20.*—Left the camp at 6·55, and followed the river in a w.n.w. direction till 8·5, when we crossed at a ledge of rocks which caused a fall of about 1 ft., the water being 20 yards wide and 1 to 2 ft. deep, but above and below the river formed fine reaches 70 yards wide. The course was now w.s.w. till 9, when the river turned w., and at 10·10 we came to a large stony creek, at which we encamped. (*Camp 16.*) The country rises gradually from the banks of the river as it recedes, and except within the influence of the floods is poor and stony, producing little besides triodia and a few small gum trees and bushes. As we progress towards the interior the rainy season seems to have been of shorter duration and the quantity of rain less, yet the great heat has forced the vegetation towards maturity, and many of the grasses have already ripened their seeds, while there are numerous indications of the dry season having set in. The wind is steadily from the s. and s.e. and is very dry; the sky is clear and bright, and the creeks have ceased to flow. In the afternoon rode out with Mr. H. Gregory to examine the country, and found that the river came through a deep gorge in the sandstone range. This gorge is 2 m. long and  $\frac{1}{4}$  mile wide, the depth 400 ft. with nearly perpendicular sides, the winter bed of the river occupying nearly the whole breadth, and the otherwise level bottom of the

valley is intersected by dry sandy channels and long pools of water; beyond the gorge the valley opened, but the view was intercepted by hills.

*Jan. 21.*—Resumed our journey at 7.10, and following the right bank of the river nearly w. through the gorge, at 9 entered an open valley through which the river came from the s.w., but at 10 again entered a second defile, which, from the inclined strata of sandstone, was almost impassable for the horses, and in crossing some soft ground between the rocks, one of the horses fell on a sharp stump and was so severely injured that he died in the night. Having extricated ourselves from this defile, encamped at the foot of a sandstone hill, the strata of which dipped  $60^{\circ}$  to the s.w. (*Camp 17.*) From the summit of the hill, which was about 300 ft. high, the country appeared more level to the s., rising into sandstone ranges about 10 m. to the s. The course of the river was from w.s.w., the channel being bounded by cliffs 100 to 200 ft. high. The general aspect of the country was wretched in the extreme, as little besides triodia and a few small gum trees clothed the rugged surface of the red sandstone. The weather continues fine, with only an occasional cloud or flash of lightning in the early part of the evening; the temperature is increasing, being  $104^{\circ}$  at 1 p.m. Some catfish and a small tortoise were caught in the river.

*Jan. 22.*—At 7 continued our route up the river, but to avoid the steep ravines on its banks, made a sweep to the s., and at noon encamped in a grassy flat on the bank of the river. (*Camp 18.*) The country traversed was very barren and rocky, the horses having great difficulty in crossing the deep ravines, and many of their shoes were torn from their feet during the day's journey. The highest ridge crossed was 500 ft. above the river, and the approximate of its channel is about 500 ft. above the sea level: thus the general elevation of the table land may be considered to be 1000 ft. above the sea level. The general course of the river being from the w., it appears desirable to reconnoitre the country to the s.

*Jan. 23.*—Leaving the camp in charge of Dr. Mueller, at 6.30 started in a southerly direction, accompanied by Messrs. H. Gregory and Baines, taking with us 4 horses and 6 days' rations, &c. After clearing the deep rocky gullies near the river, we passed over a more level country with some fine open plains covered with excellent grass, but the intervening ridges were very stony. At 9.45 reached the highest part of the range, and the country declined to the s.e., and was intersected by deep rocky ravines trending towards a large valley, which is probably drained by the southern branch of the Victoria River. The course was now s.e., descending to the valley of a creek, through very broken and rugged sandstone country, producing little but stunted eucalypti, Grevillia, acacia, and triodia. At 11.15 halted at the

creek, and resumed our route at 3, following the valley to the E.S.E. till 4.40, when it turned E. through a rocky gorge between cliffs 150 ft. high; but notwithstanding the dense brush of pandanus, fallen rocks, and the deep muddy channel of the creek, we succeeded in forcing our way through the gorge, and bivouacked in the open valley below at 5.30, there being a fine patch of grass in the flat, though the surrounding country is rocky and barren. The sandstone rocks show great disturbance, and dip at all angles and directions, so that no general direction could be determined. The upper rocks show a new feature in a coarse conglomerate of fragments of the lower sandstones and a few fragments of basalt; these fragments are usually angular and often a foot in diameter; some of the enclosed fragments of rock are rounded and water-worn. This conglomerate forms a bed 100 ft. thick. Towards evening the sky was cloudy, with lightning, but no rain.

*Jan. 24.*—At 6 crossed the creek and steered S.E. over broken sandstone ridges till 8, when we entered a plain of basaltic formation, covered with good grass, and where the ground was not wholly composed of fragments of rock the soil was a rich black loam. Crossing two large creeks, at 10 halted at the second. These creeks appear to rise in a steep range of sandstone hills, which bound the basaltic plain to the W. about 2 m. from our track. At 3 resumed our route, traversing the basaltic plain for  $1\frac{1}{2}$  hours, and bivouacked on a small gully. (*Bivouac.*) The country on both sides of our track seems to be basaltic for several miles, and then rises into sandstone hills with flat tops. The basaltic rock of this plain is not of great thickness, as the sandstone rose in a few places above its surface and formed small patches covered with coarse vegetation surrounded by the grassy plain. The basalt seems to have been poured out into the valley after it had been excavated in the sandstone, and not to have been much disturbed subsequently. The surface is very rough and stony, and the horses' feet suffered much.

*Jan. 25.*—The night was cloudy, and it was not till after daybreak that I could get an altitude for the latitude of our bivouac. At 6.5 were again in the saddle and steered S.E. to a rocky hill, which we reached at 7: it was of sandstone, rising about 150 ft. above the basaltic plain. From the summit the view was extensive, but from the broken nature of the country to the E. nothing could be traced of the courses of either creeks or rivers. To the S. the basalt plain rose to a greater elevation than the summit of the hill we were on, and was surmounted by table hills of sandstone about 10 m. distant. To the E. and N.E. the country appeared to consist of plains of basaltic formation, well grassed and thinly wooded. Leaving the hill at 8, followed a dry rocky creek to the E. and N.E. through basaltic plains with sandstone

hills and ridges till 10:30, and halted during the heat of the day. At this spot the bed of the creek had been cut through the basalt into the sandstone, exposing a fine section of the junction of the two rocks. The sandstone was much altered at the line of contact, and having been deeply cracked the basalt had filled the fissures of the older rock. This altered sandstone and also a white quartz-like rock are much used by the natives for the heads of their spears, and during this day's journey great quantities of broken stones and imperfect spear-heads were noticed on the banks of the creek. At 3:45 recommenced our journey and proceeded down the creek to the N.E. till 6:30 and bivouacked. (*Bivouac.*)

*Jan. 26.*—Having ascertained that the party could be moved across the range to the basaltic plains with advantage, we commenced our return to the camp by a westerly route across the plain, which rose gently for 10 m., and was well grassed and very thinly wooded. The soil was very stony, with fragments of altered sandstone and basalt. On the higher parts of the plain there were several hills of basalt, forming flat-topped ridges, trending N. and S.: the highest of these was named Mount Sanford, and the plains Roe Downs. The country now gradually sloped to the bank of the creek near the western limit of the plain, at which, after 6 hours' ride, we halted at 11:35. The banks of the creek are of basalt, but the sandstone is exposed in the channel, in which some of the pools were deep and permanent. At 4 resumed our route and passed over about a mile of sandstone, then 2 m. of basalt, and bivouacked at a small gully at the western limit of the plain. (*Bivouac.*)

*Jan. 27.*—At 5:30 steered N.N.W. over several ridges of sandstone till we struck our outward track, which was followed with some deviations to the camp, which was reached at 2 P.M. (*Camp 18.*) The evening was cloudy, with a heavy thunder shower. Dr. Mueller informed me that he had traced the river about 6 m. to the W.S.W., but that beyond that the direction was from N.W., apparently rising in a low range of hills which were visible.

*Jan. 28.*—Having collected the horses, at 7:15 steered S. to the rocky creek and followed it down to the rocky gorge and encamped. (*Camp 19.*) As the valley was completely walled in by steep rocks, it appeared to be a suitable place for a dépôt camp, as the horses would not be able to stray to any great distance; and from the rapidity with which the water was drying up, it became desirable that no time should be lost in pushing on to the head of the Victoria, while it was practicable to cross the ranges in which it is supposed to rise; but as many of the horses are quite unfit for the journey, it becomes necessary to leave them in some convenient spot while a small party pushes on lightly equipped.



*Jan. 29.*—Preparing equipment for the party proceeding to the interior, and making arrangements for the formation of a dépôt camp. The exploring party to consist of myself, Mr. H. Gregory, Dr. Mueller, and Charles Dean; Mr. Baines remaining at the dépôt in charge of the party. Selected 11 of the strongest horses; had them re-shod; equipped 4 with riding and 7 with pack saddles. The following provisions were packed for the journey:—pork, 150 lbs.; flour, 300 lbs.; rice, 50 lbs.; sago, 10 lbs.; sugar, 48 lbs.; tea, 8 lbs.; coffee, 6 lbs.

*Jan. 30.*—Left the camp at 7:30 and steered an average s.s.e. course till 10:20 over stony ground, at the line of junction of the sandstone and basalt formation, and camped at a fine creek which came from a rocky gorge in the sandstone range to the w. of our course. (*Camp 20.*) Mr. Baines and Bowman, who had accompanied us thus far, returned to the camp, which I had instructed them to move to this creek, as a better place for the horses, as one of them had shown symptoms of poison, and I feared to leave them in their present locality. A severe attack of fever, from which I had been suffering since the beginning of the month, precluded our proceeding farther this day, as I had at first intended. At 5 p.m. it commenced raining and continued till midnight, with incessant thunder and lightning.

*Jan. 31.*—I was sufficiently recovered this morning to be able to mount my horse, and at 8 left the camp and steered s.e. by s. along the foot of the sandstone range, the basaltic plain extending to the n.e. At 12:45 camped at a shallow watercourse trending to the s.s.w. (*Camp 21.*) The whole of the country to the e. of our track appeared to be covered with excellent grass. The evening was showery, with continual thunder for several hours.

*February 1.*—Steered n.  $160^{\circ}$  e from 6:25 till 7:30 across the basaltic plain; then crossed a large creek, in which there were some pools, that appeared permanent; then entered the sandstone country, and passed several rocky ridges. At 9:10 there was a good view from one of the higher ridges; to the e. and n. fine grassy plains extended almost to the horizon; to the s. the country consisted of sandstone range, and to the s.e. fine grassy plains and rocky ridges appeared to alternate with each other. Changing the course to s.e., traversed a fine plain covered with grass, beyond which was a rocky ridge, and then a second plain, where we halted at 11:10, as I was unable to keep on my horse owing to a recurrence of the fever. At 2 again proceeded, and after crossing some very rugged country with deep rocky ravines, at length reached a large creek, at which we encamped, though there was nothing but reeds and triodia for the horses to eat. (*Camp 22.*)

*Feb. 2.*—Left the camp at 6 and followed the creek up for three-

quarters of a mile before we could find a crossing place; the course was then s.s.e. over very broken sandstone country. At 9:50 halted in a grassy valley to feed the horses, and at 2:30 resumed the journey s.e.; crossed a sandstone ridge, and descended into a wide valley, the centre of which was occupied by a basaltic plain, at the edge of which we encamped at 3:55. (*Camp 23.*)

*Feb. 3.*—At 6 ascended the basaltic plain and steered N. 190° E. At 6:45 came to a large creek from the w., which joined the Victoria River three-quarters of a m. to the e., but the deep and rocky character of the ravine in which the river ran precluded our approaching it, and we had to turn to the w. and descend from the basaltic plain to the sandstone before the creek could be passed. Continuing an average s. course, at 10:10 reached the Victoria River, the whole channel of which did not exceed 150 yards in breadth, of which only 20 to 50 were occupied by water, and the rest by dry rocks and gravel, overgrown with bushes. With great difficulty we followed the river upwards, and were compelled to follow up a tributary creek for about 1 m. to cross it, and then encamped. Near this camp I saw the crested pigeon of Western Australia for the first time since landing on this part of the coast. (*Camp 24.*)

*Feb. 4.*—Left the camp at 5:55 and steered nearly s. for 6 hours, and then encamped on the bank of the Victoria River, at the end of a fine pool 70 yards wide, but at the lower end the water was contracted into a shallow rapid 10 yards wide. (*Camp 25.*) The country traversed is of basaltic formation in the valley, but the hills are of sandstone, and rise on each side 200 to 300 feet, and the whole appearance of the country shows that there has been little change in the form of the surface of the ground since the basalt was poured into the valley. On the banks of a small creek we saw a flock of tribonyx—a bird which has caused much speculation as to its proper habitat, as it often makes its appearance in immense numbers on the western coast of Australia.

*Feb. 5.*—Started at 5:55 and steered s.w., keeping parallel to the river at about 1 m. from it, as the creeks cut so deeply into the rock near the river that they were impassable. At 9:20 crossed to the right bank of the river and continued a s.w. course, but, finding the country exceedingly rough and rocky, turned n.w. to the river, and at 11:30 camped at a fine pool of water. (*Camp 26.*) In the afternoon we were visited by a sudden thunder squall; fortunately the tents had not been set up, or they must have been torn to pieces. The valley of the river has contracted to about 15 m., and turns to the w., but a branch seems to come from the s., and a second from the n.w. The country is becoming more level, and it is difficult to ascertain the limits of the valley, as many

portions of the original tableland exist as detached hills and ridges. Though the horses are well shod, they are becoming lame and foot-sore from continually travelling over rough stony country; more than half of the last 100 miles traversed have been so completely covered with fragments of rock, that the soil, if any exist, has been wholly concealed from sight.

*Feb. 6.*—Leaving the camp at 6·20, steered s. up the valley of a large creek. At first the ground was very rocky, but, as we proceeded, became more level and sandy, the bed of the creek being worn in the basalt, and the hills of sandstone conglomerate rising 100 to 200 ft. Except on the bank of the creek there was no grass, the hills being covered with triodia. Encamped in a grassy flat at 11·30. (*Camp 27.*)

*Feb. 7.*—At 6·30 resumed our route to the s.s.w., and reached the head of the creek at 8. Ascending the tableland by an abrupt slope our course was s. for 1 m., when the southern declivity was reached, and a large shallow valley extended across our course; beyond which a vast, and slightly undulating, plain extended to the horizon, with scarcely a rising ground to relieve the extreme monotony of surface. Descending by a very gentle slope into the valley, at 9·40 crossed a small watercourse trending s.e., and then passed through a plain densely covered with kangaroo grass 7 to 9 ft. high. At 10·40 encountered the level sandy country beyond, which was covered with triodia, small acacia, and gum-trees, or rather bushes. Seeing little prospect of either water or grass to the southward, turned e. to the creek, at which we encamped at 12·30. (*Camp 28.*) The bed of the creek was dry except a few shallow pools of rain-water, and there had been so little rain this season that no water had flowed down the channel. A level grassy flat extended nearly a mile on each side of the creek, which indicated the extent of the occasional inundations; beyond which the country was very sandy, and covered with small gum-trees, acacia, and triodia.

*Feb. 8.*—The country to the s. being so level and barren that we could not expect to find either water or grass in that direction, at 6 steered n.  $110^{\circ}$  e. along the course of the creek, which turned somewhat to the n. of our track for a few miles, but at 8 again came on its banks. The country was very barren and sandy, with small trees of silver-leaved iron-bark, acacia, and triodia, except on the inundated flats of the creek, which were well grassed and thinly timbered with box-trees. The course of the creek was nearly s.e., but the channel decreased in size and was quite dry till 10, when we reached a fine pool that had been filled by a tributary gully. Here we halted and shot several ducks. At 2·45 resumed our route, and at 3·20 came to a grassy flat, on which the channel of the creek was completely lost. Cross-

ing the flat to the E. the country was level and sandy, and therefore turned to the N., where there seemed to be a slight depression, and at 4.50 came to a shallow pool of rain-water, at which we encamped. Frequent heavy showers during the night. (*Camp 29.*)

*Feb. 9.*—On winding the chronometers this morning found that the chain of "2139 by Arnold" was broken. Taking advantage of the cool cloudy weather, we steered S. at 6.5 to ascertain if the waters of the creek, after spreading on the grassy flat, collected again. We found an outlet to the southward, but the ground rising in that direction, we observed a slight hollow to the W., for which we steered, when it terminated on the sandy plains, and the country became a perfect desert of red sand with scattered tufts of triodia and a few bushes of eucalyptus and acacia. At noon, finding it useless to proceed farther into the desert, we turned our steps to the N.N.E., and returned to our camp of last night. In returning we ascended a slight elevation from which there was an uninterrupted view of the desert from E. to S.W., the horizon being unbroken, and all appeared one slightly undulating plain, with just sufficient triodia and bushes growing on it to hide the red sand when seen at a distance. The day was remarkably cool and cloudy, the temperature at noon 86°. Though the rain had been abundant at our camp during the previous night, it had not extended more than 5 m. into the desert, which is more remarkable as the clouds were moving to the S.

*Feb. 10.*—As the horses required a day's rest, we remained at the camp, which enabled us to repair the saddlery and perform other necessary work. Repaired the chronometer and also one of the aneroids which had been broken by the motion of the pack-horse. As there was no practicable route to the S., and the sandstone hills to the N. seemed to diminish in elevation to the E., I decided on following the northern limit of the desert to the W. till some line of practicable country was found by which to penetrate to the S. In selecting a westerly course I was also influenced by the greater elevation of the country on the western side of the Victoria, and the fact that all the larger tributaries join from that side of the valley. It is also probable that, should the waters of the interior not be lost in the sandy desert, they will follow the southern limit of the elevated tract of sandstone which occupies North-Western Australia from Roebuck Bay to the Gulf of Carpentaria, both of which points are nearly in the same latitude as our present position, from which it may be assumed that the line of greatest elevation is between the 17th and 18th parallels. None of the rivers crossed by Leichhardt are of sufficient magnitude to drain the country beyond the coast range, and therefore any stream descending from the tableland to the S. will either be

absorbed in the desert or follow the southern limit of the sandstones, and flow into the sea to the s.w. of Roebuck Bay. There is, however, reason to expect that as the interior of North-Western Australia is partly within the influence of tropical, and partly the extra tropical climates, it does not enjoy a regular rainy season, and though heavy rain doubtless falls at times, it is neither sufficiently regular nor general to form rivers of sufficient magnitude to force their way through the flat sandy country to the coast.

*Feb. 11.*—At 6:30 proceeded up the creek, and at 12:30 camped at a shallow pool of rain-water on the flat, the channel of the creek being quite dry. (*Camp 30*, lat.  $18^{\circ} 15' 26''$ .) On the northern side of the creek we passed a small lagoon with a great number of ducks and other waterfowl on it. The afternoon was cloudy with a fresh breeze from the s.e.

*Feb. 12.*—Three of the horses having strayed some distance, we did not start till 7, when we steered an average course of N.  $300^{\circ}$  E. till 11:45, when we camped at a small pool of water in the bed of the creek, which was reduced to a small gully. (*Camp 31*, lat.  $18^{\circ} 9' 44''$ .) For the first 4 m. we traversed the grassy flats of the creek, after which we passed over a level sandy country, producing nothing but triodia, stunted eucalypti, and acacia, till we again approached the creek, where the grassy flat was nearly half a mile wide, but of inferior character.

*Feb. 13.*—At 6:50 followed the valley of the creek to the w., passing through some fine flats with high grass, but the country generally very poor and thinly timbered with white gum and silver-leaved ironbark. At 10:40 halted at a small pool of water, at the foot of a low granite ridge. (*Camp 32*, lat.  $18^{\circ} 11' 20''$ .) At 3 ascended the granite hills, which rose abruptly 100 to 150 ft. above the level of the plain, and extended to the s.e. about 5 m.; to the w. the sandstones covered the granite and formed a level tableland or plain; and to the n. a valley trended to the w., on the northern side of which the hills appeared to be granitic. Returning to the camp, examined a deep ravine, and found some small pools of water which might last nearly another month.

*Feb. 14.*—Leaving the camp at 6, steered an average course N.  $300^{\circ}$  E.; crossing the granite ridge, we entered a level sandy country with much scrub, which was traversed till 8:40, when we entered a wide grassy plain extending to the n.w., in which direction we steered till 2:10, when we halted at a small muddy puddle 2 inches deep and 3 yards wide. I then rode on to search for a better supply of water, and found a shallow pool about a mile distant, to which the party was moved and encamped. (*Camp 33.*)

Although this pool was not 100 yards long and 6 inches deep, large flocks of ducks, snipe, and small gulls were congregated at it, and several thousand pigeons of a species new to us came to

drink. These pigeons keep in flocks of ten to more than a thousand, feeding on the seeds of the grass on the open plains, as they never alight in trees. They are somewhat larger than the common bronze-wing; the head is black, with a little white at the base of the beak and behind the eye; back, pale brown; breast, blue; throat, marked with white; wing, with white tips to the feathers and a small patch of bronze; tail, short, tip white; feet, dull red.

*Feb. 15.*—At 6:15 followed a line of small trees and bushes which grew on the lower part of the grassy plain, and indicated the course of the water in the wet season, and at 9 came to the head of a small creek trending N.W. Water was now abundant, and formed large pools, and at 11:15 camped on the right bank of the creek, at a pool  $\frac{1}{2}$  m. long and 50 yards wide. (*Camp 34*, lat.  $17^{\circ} 53' 50''$ .) This spot seemed to be much frequented by the natives, and large quantities of mussel-shells lay around their fires. The plain traversed this morning was well grassed, the soil a stiff clay loam: it extended 3 to 6 m. on each side of the track, and was bounded by wooded country, which in some parts rose nearly 100 ft. above the level of the plain. On the lower parts of the plain we saw the salt-bush (*Atriplex*) and a species of rice, but as it was only just in ear we could not judge of the quality of the grain. In the afternoon there was a fine breeze from the E., which lasted till 8 P.M., the sky being cloudy.

*Feb. 16.*—At 6:5 resumed our journey down the creek, which first turned W., and then S.W. At 12:20 camped at a small pool. (*Camp 35*, lat.  $17^{\circ} 59' 40''$ .) On the right bank of the creek, wide grassy plains extended from 3 to 5 m. back towards a low wooded ridge, but on the left bank the scrubby country came close to the creek.

*Feb. 17, Sunday.*—As water and grass were abundant, we were not compelled to move on in search of these requisites, and were enabled to observe it as a day of rest.

*Feb. 18.*—Resumed our journey at 6:30, and steered an average S.W. course till 11, then S. till 12:25, and again camped on the creek. (*Camp 36*, lat.  $18^{\circ} 11' 40''$ .) The country consisted of wide grassy plains on the bank of the creek; beyond the plains at 1 to 6 m. distance low wooded ridges were visible, but the general aspect of the whole country was extremely level. A great number of ducks and a few geese were seen on the pools in the creek.

*Feb. 19.*—Commenced our day's journey at 6, followed the bank of the creek S. till 8:15, then S.S.W. till noon, when the course was changed to S.S.E. to close in with the creek, but found that the channel of the creek was completely lost on the level grassy plain. At 1:40 camped at a small puddle of muddy water as thick as

cream with white clay. (*Camp 37.*) Before the creek terminated in the plain it spread into some large though shallow pools, which teemed with ducks of several species, but principally the whistling duck. The grass gradually extended to a greater breadth, and the back country was so nearly level that it scarcely rose above the grassy horizon, while to the s. it was so flat that the clumps of bushes looked like islands, the grassy plain extending to the horizon. Near one of the water-holes in the creek we surprised a native, who was sitting at a fire with two women, who decamped with all possible despatch. Several smokes have been observed to the s. and s.w., which show that water must exist in that direction, though it may not be sufficient for the supply of our horses. The morning was cloudy, and at midnight there was a heavy shower of rain. Judging from the general appearance of the country, the waters of the creek, after spreading over the plain, must escape to the westward, as the grass has been bent in that direction by the current last year, but there has been so little rain this season that the channel of the creek has not been filled.

*Feb. 20.*—As it appeared that the waters of the creek trended to the w. in the wet season, at 6.5 we steered N.  $250^{\circ}$  E., through a level forest of box-trees with abundance of good grass, the soil a brown loam with fragments of limestone. The shower last night had left many shallow pools of water on the surface. At 8.30 passed a small swampy salt flat covered with salicornia, and at 9.10 came on the grassy plain, which we skirted on a w. course, but as it turned to the N.W. changed the course to N.  $320^{\circ}$  E. The plain narrowed to about a mile in width, and therefore crossed it in search of a definite channel, but without success, though there were some slight indications that during inundation the water flowed to the N.W. At 11.50 camped at a shallow puddle of rain-water on the N. side of the plain. (*Camp 38.*) From the morning's camp till 8 the grass, though very backward, showed that there had been sufficient rain to cause it to spring, but as we proceeded it was perfectly dry and parched up as at the end of the dry season, showing that little or no rain had fallen this year. The day was cloudy with thunder, and was followed by a heavy shower at night, which prevented my ascertaining the latitude by observation.

*Feb. 21.*—As we were now 3 days' journey from any water which could be depended on for more than a few days, and the channel of the creek had been so completely lost on the plain that it was uncertain whether the marks of inundation near the camp had been caused by the creek flowing w., or a tributary flowing to the E., I determined to attempt a s.w. course, in the hope that should the country prove rocky, the heavy showers might have collected a sufficient quantity of water to enable us to continue

a southerly route, and accordingly selected the most prominent point of the rising ground to the s. of our position, and at 6.5 steered for it N.  $235^{\circ}$  E. After leaving the open plain entered a grassy box flat, which continued to the foot of the hills, which we reached at 8. The slope of the hills proved very scrubby, with small eucalypti and acacia; the soil red sand and ironstone gravel. At 9 reached the highest part of the hills for many miles around. To the s. it was slightly depressed for 10 or 15 m., and then rose into an even ridge or plain, the whole appearing to be covered with acacia and eucalyptus scrub; to the w. and n. the view was more extended; the low ridge of sandstone hills to the n. of the grassy plains extended to the w.n.w. for 30 m., only broken by a large valley from the n. Throughout its whole length this range appeared to rise 150 or 200 ft. above the plain, and had the appearance of being the edge of a level tableland. S. of the grassy plain (the western limit of which was not seen) the country rose gradually to 80 or 100 ft., and presented a very level and unvaried appearance. It was evident that our only chance of farther progress was to follow the grassy plain to the w. till some change in the country rendered a southerly course practicable, it being probable that some creek from the n. might join the grassy plain, and that the channel which had been dissipated might be reformed. At 9.30 steered N.W., and at 12.30 cleared the acacia scrub. At 1.30 reached the bank of the creek, which had formed a channel 20 yards wide, with pools of brackish water; but we were too glad to find any water which could be used without detriment, to object to it because not agreeable to the taste, and therefore encamped.—(*Camp 39.*) We have thus been a second time compelled to make a retrograde movement to the n., after reaching the same latitude as in the first attempt to penetrate the desert; but I did not feel justified in incurring the extreme risk which would have attended any other course, though following the creek is by no means free from danger, as very few of the water holes which have supplied us on the outward track will retain any water till the time of our return. The weather was calm and hot in the early part of the day, in the afternoon it clouded over, and there was a slight shower of rain. According to our longitude by account we have this day passed the boundary of Western Australia, which is the 129th meridian.

*Feb. 22.*—Leaving the camp at 5.40, followed the creek to the w.s.w., and crossed a small gully from the s.—(*Camp 40.*) At 11.30 camped at a fine pool of water in a small creek from the s., close to its junction with the principal creek, which I now named after Captain Sturt, whose researches in Australia are too well known to need comment. The grassy plains extend from 3 to 10 m. on each side of the creek, which has a more definite



channel than higher up, there being some pools of sufficient size to retain water throughout the year.

The plain is bounded on the N. by sandstone hills 100 to 200 ft. high, and there is also a mass of hilly country to the S., the highest point of which was named Mount Wittenoom. About noon a thunder shower passed to the E. and up the creek on which we were encamped, and though the channel was then dry between the pools, at 6 it was running 2 ft. deep. The grass is much greener near this camp, and there has evidently been more rain here, than in any part of the country S. of the Victoria yet visited. A fresh southerly breeze in the morning, thunder storm at noon, night cloudy, with heavy dew.

*Feb. 23.*—Resumed our journey down the creek, the general course first S.W. and then S.S.W. The channel was gradually lost on the broad swampy flat, which was overgrown with polygonum and atriplex, &c., and had a breadth of about a mile, being depressed about 10 ft. below the grassy plain, which has a width of 15 m. The hills are of less height, and the whole country so level that little is to be seen but the distant horizon scarcely rising above the vast expanse of waving grass. At 9.30 entered an open grassy box flat, and at 10.50 camped at a shallow puddle of muddy water just sufficient to supply the horses. I walked about a mile into the Polygonum flat, but could not find any water, though the ground was soft and muddy in some parts. Mr. H. Gregory, when rounding up the horses in the evening, saw 8 blacks watching us: we therefore went out to communicate with them, but they hid themselves in the high bushes and grass. The night was clear, and I took a set of lunar distances, which the cloudy weather had prevented for more than a week, though I had been able to get altitudes for the latitude.

*Feb. 24.*—At 6 continued the route down the creek, which spread into a broad and swampy flat about a mile wide, and covered with atriplex and polygonum, the general trend S.W. At 7.30 crossed a large water course with a dry sandy channel coming from S.E.; no water having flowed down it this evening. At 9 crossed to the right bank of the creek: there were many shallow muddy hollows, and one shallow channel of running water 4 yards wide and 1 ft. deep. The largest channel was near the W. side of the flat, but except a shallow pool it was dry. As we advanced the country showed the effect of long continued drought, and though the creek had some large shallow pools, the channel was dry between them, the soil absorbing the whole of the water which was running in it above. At 11.50 encamped at what appeared to be the termination of the pools of water, as the channel was again lost on a level flat. Great numbers of ducks, cockatoos, cranes, and crows frequented the banks of the creek above the

camp, and appeared to feed on the wild rice and panicum which were growing in considerable quantities in the moist hollows. To the S.E. of the creek there is a level box flat which extends 2 or 3 m. back to the foot of some low sandy ridges, covered with triodia and a few small eucalypti. To the N.W. and W. the grassy plain extended to the horizon, with scarcely a break to interrupt the even surface of waving grass.

*Feb. 25.*—The small number of water fowl which passed either up or down the creek during the night indicated that water was not abundant below our present position, and we therefore prepared for a dry country, and were not disappointed; for, leaving the camp at 6.15, we traversed a level box flat covered with long dry grass. At 9 again entered the channel of the creek, which was now a wide flat of deeply cracked mud, overgrown with atriplex, which had lost all its leaves from long continued dry weather. The flat was traversed by numerous small channels from 1 to 2 ft. deep, but they were dry, and had not contained water for more than a year; there were, however, marks of former inundations when the country must have exhibited a very different appearance; and had it then been visited by an explorer, the account of a fine river, nearly a mile wide, flowing through splendid plains of high grass, could scarcely be reconciled with the facts I now have to record, of a mud flat deeply fissured by the scorching rays of a tropical sun, the absence of water, and even scarcity of grass. The creek now turned to the S., and we followed the shallow channels till 12.30, when we fortunately came to a small pool which had been filled by a passing shower, and here we encamped. During the day a fresh breeze blew from the S. and S.E., and the air was exceedingly warm, the thermometer  $106^{\circ}$ , but being very dry, was not oppressive.

*Feb. 26.*—As the course of the creek was uncertain, we steered S. at 5.45 across the Atriplex plain, and at 6.35 reached the ordinary right bank of the creek, which was low and gravelly, covered with triodia and small bushes; we then passed a patch of green forest, and at 8 entered a grassy plain which had been favoured by a passing shower: green grass was abundant, and even some small puddles of water remained in the hollows of the clay soil. At 10.50 came on the creek, which had collected into a single channel and formed pools, some of which appeared to be permanent, as they contained small fish. At one of these pools we encamped at 11.10. The channel of the creek is about 15 ft. below the level of the plain, and is marked by a line of small flooded gum trees. The atriplex flat has ceased, and the soil is a hard white clay producing salsola and a little grass. The morning clear, with a moderate breeze from E. Afternoon cloudy, with a few drops of rain at night.

*Feb. 27.*—Resumed our journey down the creek at 6·5 on a general course s.w. till 7·15, when it turned to the w., and formed a fine lakelike reach of water 200 yards wide, with rocky banks and sandstone ridges on both sides of the creek. At 11 camped at the lower end of a fine reach trending s. The general character of these reaches of water is, that they are very shallow and separated by wide spaces of dry channel, the water being 10 ft. below the running level. The country is very inferior, and the grassy flats are reduced to very narrow limits, the hills being red sandstone, producing nothing but triodia and small gum trees.

*Feb. 28.*—At 6 were again in the saddle following the creek, which had an average w.s.w. course, but the channel was soon lost on a wide grassy flat with polygonum and atriplex. A few large detached pools however existed, and were 50 to 100 yards wide, and  $\frac{1}{4}$  to  $\frac{1}{2}$  a m. long, although the dry season had reduced them to much narrower limits than usual, as they were 8 ft. below the level of the plain. At 11·45 camped at a large sheet of water just above a remarkable ridge of sandstone rock on the right bank of the creek. Ducks, pelicans, and spoonbills were very numerous, but so wild that they could not be approached within gun-shot. Until the present time it had been doubtful whether the creek turned towards Cambridge Gulf, the interior, or the coast westward of the Fitzroy River; but the first point being now 220 nautic. m. to the N., and the general course of Sturt Creek s.w., such a course is not probable, and it therefore only remains to determine whether it is lost in the level plains of the interior, or finds an outlet on the N.w. coast. The careful and minute surveys of the coast from the Victoria to Roebuck Bay show that no rivers exist of such magnitude as Sturt Creek would attain in passing through the ranges to the coast; nor does the generally abrupt character of the coast line favour the supposition that any interior waters find an outlet in this space. That the elevation of this part of the creek is sufficient to enable it to form a channel to the N.w. coast is shown by the barometric measurements already made. The dividing ridge between the head of the Victoria and Hooker Creek is about 1200 ft., at the head of Sturt Creek 1370, and our present camp 1100 ft. above the sea. Thus the average fall of Sturt Creek has been 270 ft. in 180 m., or  $1\frac{1}{2}$  ft. per m. Now the distance to Desault Bay (which appears the most probable outlet) is 370 m.; and allowing an increase to 500 m. for deviations, there would be more than 2 ft. fall per m., which is sufficient for the maintenance of a channel. Should the creek turn to the s. and enter the sandy desert country, the waters would soon be absorbed, especially as the wet season at the upper part of the creek occurs at the time of the dry season in the lower part of its

course. That it does lose itself in a barren sandy country is, I fear, the most probable termination of the creek; and that a level sandy country exists for many miles on each side of our route is shown by the small number and size of the tributary water-courses.

*Feb. 29.*—Leaving the camp at 5:40, traced the creek to the s.w. for about 3 m.: it formed fine reaches of water 50 to 100 yards wide, but the channel again suddenly terminated in a level flat covered with polygonum, atriplex, and grass. In this flat there were some shallow pools of water. At 7:30 the creek turned to the w., round the N. end of a rocky sandstone hill, and was joined by a tributary gully from the N., below which point the channel had well defined banks and a dry sandy bottom, and long parallel water holes on each side, but very little water remained at this time. At 9:30 the course of the creek changed to s. by w., and passed through a level flat timbered with flooded gum trees; it was about a mile wide and well grassed, but completely dried up for want of rain. The back country was thinly wooded with white gum, and rose gently as it receded, forming sandstone hills about 100 ft. high, of extremely barren appearance. At 11:45 camped at a small muddy pool which would last only a few days longer. A strong breeze commenced early in the day from the w. and gradually changed to s. Thermometer  $109^{\circ}$  in the coolest shade that existed.

*March 1.*—Our horses having strayed farther than usual in search of better grass, we were delayed till 6:20, when we steered a s. by w. course down the valley of the creek. Immediately below the camp the country beyond the effect of inundation by the creek changed to a nearly level plain of red sand, producing nothing but triodia and stunted bushes, the level of this desert country being only broken by low parallel ridges of drifted sand perfectly straight, and with a direction nearly E. and W. At 11:30 camped at a fine pool of water 3 to 5 ft. deep and 20 yards wide. That we had now entered the desert was apparent, and the increase of temperature during the past 3 days was easily explained; but whether this desert is part of that visited by Captain Sturt, or an isolated patch, has yet to be ascertained; and the only hope is that the creek will enable us to continue our course, as the nature of the country renders an advance impracticable except by following water courses.

*March 2.*—Left our camp at 6:30 and steered s.w. by w., which soon took us into the sandy desert on the left bank of the creek. Crossing one of the sand ridges, got a sight of a low range of sandstone hills to the s.e., the highest of which I named Mount Mueller, as the Doctor had been the first to discover them while collecting plants on the sandy ridge the previous evening.

At 10:15 again made the creek, which had scarcely any channel to mark its course: the wide clay flat bearing the marks of previous inundation was the only indication visible. At 12:35 camped on a small muddy puddle, the grass very scant and dry. The traces of natives are frequent. Large flights of pigeons feed on the grassy plains, and a small flight of white cockatoos were seen.

*March 3.*—At 5:30 started and followed the creek on a general course s.w.; there were very irregular channels, sometimes 10 yards wide and very shallow, and then expanding into pools 50 yards wide. The sandy plain encroached much on the grassy flats, and reduced the winter course of the creek to  $\frac{1}{2}$  a mile. At 8 the course was changed to s., and at 10:55 encamped at a small swamp which was nearly dried up, and covered with beautiful grass. The country differed slightly in character from that seen yesterday, there being a few patches of white gum trees and a few acacia with tall stems; *salsola* and *salicornia* are also abundant, and show the saline nature of the soil.

*March 4.*—Left the camp at 5:50 and steered s.w. over a level country, with shallow hollows filled with a dense growth of acacia, and at 7:30 struck the creek, which had a sandy channel and narrow flats covered with *salsola* and *salicornia*. The pools were very shallow, and gradually became salt, and at 10:15 spread out into the dry bed of a salt lake more than a mile in diameter, and this was connected by a broad channel of salt water with a second dry lake 7 or 8 m. across. As there was little chance of water ahead, and the day far advanced, we returned to one of the brackish pools and encamped. The country passed over was of a worthless character, and so much impregnated with salt that the surface of the ground is often covered with a thin crust of salt.

*March 5.*—Started from the camp at 5:45, and steered s.s.e. through the acacia wood to the lake, and then s. by e. across its dry bed towards a break in the trees on the s. side; here we found a creek joining the lake from the s.w., in which there were some pools of rain water. We then steered e. to intersect any channel by which the waters of the lake might escape to the southward or s.e., and passing through a wood of acacia, entered the sandy desert. As some low rocky hills were visible to the e. steered for them, and at 2:10 halted  $\frac{1}{2}$  a m. from the foot of the highest, and then ascended it on foot. These hills were very barren and rocky, scarcely 80 ft. above the plain, formed of sandstone in horizontal strata. From the summit of this hill nothing was visible but one unbounded waste of sandy ridges and low rocky hillocks which lay to the s.e. of the hill. All was one inhospitable desert, as the flat and sandy country which could

absorb the waters of the creek was not capable of originating water courses. Descending the hill, which I named Mount Wilson, after the geologist attached to the expedition, we returned towards the creek at the s. end of the lake, reaching it at 9.30 P.M.

*March 6.*—As the day was extremely hot, and the horses required both food and rest, we remained at the camp. Ducks were numerous on some of the pools, but so wild that only two were shot. The early part of the day was clear, with a hot, strong breeze, varying from W. to S.E. At 1 P.M. there was a heavy thunder-squall from S.E., which swept a cloud of salt and dry mud from the surface of the dry lake; the squall was followed by a slight shower of rain.

*March 7.*—As I had frequently observed that in the dry channels of creeks traversing very level country, a heavy shower in the lower part of its course often causes a strong current of water to rush up the stream bed, and leave marks which would mislead a person examining them in the dry season, it seemed possible that this might be the case with the creek entering the lake at its s.w. angle, as it might really be the outlet of the lake when filled by Sturt Creek flowing into it, though in ordinary seasons the flow of the water would be into the lake. Accordingly I decided on following the creek to ascertain its actual course; and leaving the camp at 5.50, steered nearly s.w. along the general course of the creek till 7.30, when it turned to the north, and entered the dry bed of a lake. As the beds of the two lakes were lower than the channel between, the water during the last heavy rain had flowed both ways from the central part of the channel. Having skirted the lake on the w. to intercept any watercourses which might enter or leave the lake on that side, we came to a large shallow channel with pools of water, some fresh and others salt, with a broad margin of salicornia on their banks. At 11 camped on a small pool of fresh water. The soil on the banks of the creek is loose white sand with concretions of lime, covered with a dense growth of tall acacia, with salsola and a little grass in the open spaces.

*March 8.*—Started at 6.5, and traced the creek into the salt lake to the w., but this was also dry. After some search found a creek joining on the n. side, and communicating with a large mud plain partly overgrown with salicornia, and with large shallow pools of water very muddy and 2 to 3 inches deep. On the northern side this plain narrowed into a sandy creek, with shallow pools, the flow of the water being decidedly from the northward. At 12.15 camped at a shallow pool, near which there was a little grass, the country generally being sandy, and only producing triodia and acacia. Thus, after having followed Sturt Creek for nearly 300 m., we have been disappointed in the

hope that it would lead to some important outlet of the waters of the interior. It has, however, enabled us to penetrate far into the sandy tract of country, which may be termed the Great Australian Desert.

*March 9.*—Left our camp at 6·35, and followed the creek up for half an hour, and then steered east to Sturt Creek, which we reached at 9·5, the country being level, sandy, and covered with triodia and patches of acacia. We then steered a southerly course down the creek till 11, and encamped at the large brackish pool.

*March 10.*—As I had observed that a creek appeared to join the salt lake at the N.E. angle, there yet remained a possibility that the waters of the lake might find an outlet to the east, and pass to the north of Mount Wilson. We therefore steered east from the camp at 6·45, and passed close to the south side of a small dry salt lake  $\frac{3}{4}$  m. in diameter, and then traversed a level sandy country thickly wooded with acacia, and a few white gum-trees. At 8·15 struck a small grassy watercourse; this we followed down to the S.S.W. to the large salt lake, close to which it was joined by a small sandy creek coming from the east. Having reached the bank of the lake at 10, steered south along its shore till 11·15, when its shore trended to the W.S.W., and there was a well defined bank without a break, to the point which had been the limit of our examination from the southern part of the lake, and thus determined that there was no outlet for the waters to the east. As the whole country to the south was one vast desert destitute of any indications of the existence of water, it was clear that no useful results could arise from an attempt to penetrate this inhospitable region, especially as the loss of any of the horses might deprive the expedition of the means for carrying out the explorations towards the Gulf of Carpentaria. I therefore decided on commencing our retreat to the Victoria while it was practicable, as the rapid evaporation and increasing saltiness of the water in this arid and inhospitable region warned us that each day we delayed increased the difficulty of the return; and it is even possible that we are now cut off from communication with the party at the dépôt by an impassable tract of dry country, and may be compelled to maintain ourselves on the lower part of the creek till the ensuing rainy season. Returned to the creek at the N.E. angle of the lake, and encamped. The morning was cloudy, with a strong hot wind from E. and S.E., the night calm and misty.

*March 11.*—At 6·10 left the camp, and followed the creek to the N.N.E., but it soon spread into a number of small gullies which drained a patch of clay land. At 7 steered north through a wood of tall acacia growing on loose sandy soil, and entered the open

sandy plain at 8.15. A few small white gum-trees were scattered over this part of the plain, which was quite level, and covered with triodia, which partially concealed the glaring red colour of the sand. Observing a low but abrupt hill a little to the east of our course, turned towards it, and ascended it at 10; its height was less than 100 ft., and was composed of the same sandstone which prevails over the whole country south of the Victoria. The view was cheerless in the extreme. From N.  $26^{\circ}$  E. to N.  $166^{\circ}$  E. the country was a level plain with small isolated hills, sometimes grouped together, but not forming definite ranges; the even height and peculiar table summits appear to indicate that they are only small remaining portions of a sandstone table-land or plain, nearly the whole of which has been removed. The stratum has, however, a slight dip of  $1^{\circ}$  to  $2^{\circ}$  to the east. The vegetation of this part of the country was reduced to a few stunted gum-trees, hakea-bushes, and triodia, the whole extremely barren in appearance. The remaining portion of the horizon was one straight even line; not a hill or break of any kind was visible, and, except the narrow line of the creek, was barren and worthless: the red soil of the level portions of the surface being partially clothed with triodia and a few small trees, or rather bushes, rendered the long straight ridges of fiery red-sand more conspicuous. The wind being strong, we observed several fires along the course of the creek, and also one near Mt. Mueller to the N.E., indicating that natives existed in that direction, and doubtless water in the vicinity, as it was a day's journey from the creek. Our course was now N.  $340^{\circ}$  E., and on approaching the creek passed through a patch of casuarina forest, which was remarkable, as they are the only trees of this genus we had seen since landing at the Victoria, though abundant in all other known parts of Australia. At 1.30 reached Sturt Creek, and halted at our camp of the 2nd of March. (*Camp 49.*) There was a strong hot wind during the day.

*March 12.*—Resumed our route at 5.55, and steered N.  $20^{\circ}$  E. till 8, then  $40^{\circ}$  and  $60^{\circ}$  till 1, when we encamped at a shallow pool of water near the creek, and about 3 m. above Camp 48. As the route only traversed the level flats of the creek, nothing worthy of farther notice was seen. The channel being split into small hollows, some of which retained a little water, the grass was much dried up and limited to the flat near the creek, the more remote portions being covered with triodia. The day was hot and nearly calm, but at noon we were benefited by a few passing clouds, and at 6 a dry thunderstorm cooled the air from  $100^{\circ}$  to  $93^{\circ}$ , but the temperature rose to  $96^{\circ}$  at 8.

*March 13.*—At 5.50 steered N.  $10^{\circ}$  E., crossing the creek several times, and at 10 turned to the N.N.E. and N.E., crossing



the sandstone hills round which the creek turns at a right angle, and at 12·10 camped on the creek, near 8·40, on our track of the 29th February. Nearly all the pools of water had dried up, and the water at the camp had become brackish; some of the pools, however, must be permanent, as there are small fish in them. A large party of natives appear to be moving up the creek, as fresh fires are continually seen to the N.E. along its course. A cool breeze from W. to N.E. moderated the heat; the temperature at 2 P.M.  $103^{\circ}$ ; passing clouds from N.E. in the afternoon.

*March 14.*—Resumed our route, and followed the creek upwards from 5·50 till 1·5, when we encamped about 3 m. S.W. of Camp 45, at the first pool above the *Atriplex* flat. A short distance above the camp we crossed a large sandy creek from the north, which proved to be the cause of the change in the character of the creek below that point. As our route was at a greater distance from the creek than in tracing it down, it gave a good opportunity of ascertaining the nature of the country beyond the limits of the inundations of the creek. To the S.W. a vast plain, traversed by low ridges of gravel and drift sand, clothed with triodia and a few *bakea*-bushes, rose gradually from the creek; but on the S.E. a more abrupt sandstone slope terminated in a similar plain of somewhat greater elevation, and showed that we were still within the limits of the desert. Moderate breeze from N.W., changing to N.E.; passing clouds; a light shower at 11 P.M.

*March 15.*—Resumed our route at 5·50, and steering N.  $40^{\circ}$  E. 1 hour into the triodia plain; then N.  $60^{\circ}$  E. till 9·20, when we reached the first large pool in the creek, and rounding the bend camped at one of the narrow pools above the sandstone ridge. The waters of the larger pools had sunk from 6 to 12 inches since we passed downwards, and almost all the smaller pools were now dry. The morning clear and cool, with clouds and light showers in the afternoon accompanied with thunder.

*March 16.*—As there was no water in the creek for the next 33 m., we filled our water-bags and prepared for an early start; but unfortunately the horses had strayed farther than usual, which delayed us till 7, when following nearly the outward route, we passed close to the water-hole at Camp 43, but it was now dry. At 1 halted under the shade of a few *acacia*-trees during the heat of the day, and resumed our route at 3, following the eastern side of the plain through which the creek passes. The ground was stony, and bad travelling; but as the moon was bright, we succeeded in reaching the first pool of water at 8·30; this was a mile above Camp 42, the water at which had dried up, though 4 ft. deep on the 24th Feb. The pool at which we now camped appears to be permanent; it is 100 yards wide and 300 yards long; the water 3 ft. deep close to the bank. Ducks were

numerous, and I shot four in the early morning. An easterly breeze continued through the day, and as usual there were a few clouds towards sunset. Unfortunately the dry weather has warped the boxwood scale of the thermometer to such an extent that it broke the tube.

*March 17.*—We were again delayed by several trifling circumstances, and did not leave the camp till 7.40; but having nearly cleared the desert the weather was comparatively cool. Steering an average N.E. course, traversed the wide grassy plain on the right bank of the creek, to which the name of Denison Plains was given. At 2 camped at a small pool in the Polygonum flat, which was all that remained of the water which had covered the flat to the extent of  $\frac{3}{4}$  m. last month. Our course this day showed the great extent of the grassy plains to the N.W., as we did not see the limit at any point in that direction. Cool breeze from E, with thin clouds all day.

*March 18.*—Left the camp at daylight, and proceeded to Camp 40 on the outward route, and halted for the remainder of the day to rest the horses, as a heavy stage lay before us over the dry country. Large flights of cockatoos came to the pool at this camp, and we shot thirty-three, which were a welcome addition to our provisions. Strong easterly breeze; passing clouds.

*March 19.*—Steered N.  $60^{\circ}$  E. at 6.35, and followed up the course of the creek, crossing to the right bank at 9, where there was nothing but the Polygonum flat to mark its course. At 10.30 turned nearly east, passing a large sheet of brackish water, which appeared deep and permanent at the lower end, but shallow at the upper part. At 11.20 camped at a small pool of fresh water in a back channel, as we were anxious to get a supply of good water before proceeding farther, as the next three stages were without any known water. Fresh breeze from E.

*March 20.*—At 5.55 steered  $110^{\circ}$ ; at 6.20 struck a small creek with steep banks. Altered the course to  $90^{\circ}$ ; crossed two small watercourses from the north with a little water in them in the deeper parts of the channel. The general character of the country box-flats and open grassy plains near the creek. At 7.25 entered a large grassy plain, extending N. and E. for 10 m., and at 9.15 halted at a small watercourse, which retained a little water in a grassy hollow, the object of halting thus early being to enable us to start fresh in the afternoon, and, should the country continue open, to push on through the night, by which the water could be reached before the heat of the sun was too great for travelling. At 3.5 resumed our route, and traversed a level grassy plain, extending 1 to 5 m. on each side of the track. At 7 observed a native fire about 2 m. to the north, from which we concluded that water existed at no great distance; and at 7.15

were fortunate in finding a pool of rain-water in a slight depression of the plain, and encamped, but could not find sufficient wood to boil our tea, though we were well satisfied with having abundance of water.

*March 21.*—We were again in our saddles at 5·15, and continuing our course N. 70° E., at 6·40 reached the limit of the grassy plains which turned to the S.E., and extended to the horizon. We then entered a wooded country, and the soil changed from a rich dark loam to a sandy and gravelly soil, with fragments of sandstone; the vegetation consisted of small white gum-trees, shrubby acacia, and triodia, with a few patches of grass. The country gradually rose till 9·20, when we came to an abrupt descent into the valley of Sturt Creek; but the country did not improve in character till 10·20, when we came to the grassy flats. At 10·50 camped at a large open pool of water in the bed of the creek. On the pool there were a great number of ducks, but so wild that they could not be approached within range of our guns. Moderate breeze from E., with light clouds from the S.E. during the day. The weather has been so misty for the last ten days, that I have been unable to get a good set of lunar distances, and it is useless to observe unless under circumstances favourable to accuracy.

*March 22.*—5·35 found us again travelling up the creek on a northerly course, and at 7·20 changed the course to N.E. by N., and at 11·25 camped about a mile below Camp 35. The hill at the bend of the creek proved to be basaltic, with a stratum of sandstone conglomerate resting on the top. The pools in the creek were much reduced, and all the small ones dried up.

*March 23, Sunday.*—The feed and water not being such as would permit of our resting here, we followed up the creek nearly on the outward track. A few miles above the camp a party of blacks came out of the creek, and commenced a distant parley, but on one of the party approaching, they picked up the spears that had been secreted in the grass, and ran away into the bed of the creek. After 6½ hours' journey camped at the lower end of the pool, where we had halted on the 15th February. Near the northern bend of the creek we passed a fine deep pool, which appears to retain water through the dry season. All the smaller pools had dried up, and the larger reduced 2 ft.

*March 24.*—As the horses had not had a day's rest for some time past, we remained at the camp to refresh them, before attempting to cross the dry country which divides the southern waters from those flowing to the N.W. coast, as the nearest water which we knew to exist was 50 m. to the E., and the country in that direction very bad travelling. We were, however, only 80 m. in a direct line from the Dépôt Camp, and as that course

would take us over new country, I decided on attempting the direct route.

*March 25.*—At 6·20 steered N.  $40^{\circ}$  E., and, leaving Sturt Creek, traversed open grassy plains till 9·5, when we entered a wooded country, with white gum trees and an undergrowth of acacia, with triodia and patches of grass; the soil a red sandy loam. At 11 passed to the s. of an extensive grassy plain, extending to the n.w. At 12·30 halted to ease the horses' backs from the loads, and resumed our route at 1·40, and at 2 crossed a ridge of stony country, which the aneroid showed to be about 1700 ft. above the sea level, and was the highest spot yet visited by the Expedition. At 2·20 altered the course to E., and followed a slight depression till 4, when we came to a dry water-course trending n.w.; this was traced down in search of water till 6·30 without success, and we halted for the night. The day having been calm and very hot, the horses were much distressed for want of water; but as there was a little green grass on the bank of the creek, they were able to feed for a few hours during the night.

*March 26.*—Proceeded down the creek, and at 7·20 came to a small pool of water, which the horses emptied in the space of a few minutes; but farther on came to a larger supply, and some of the pools seemed to be permanent, having a belt of water pandanus and reeds round them; below this the channel was dry and sandy, but much enlarged by tributary gullies. At noon came to a shallow pool, at which we encamped. The country through which this creek passes is poor and stony, low hills of sandstone, chert, and limestone rising immediately behind the narrow grassy flats of the creek, which are fertilized by its overflow in the wet season. The vegetable productions of the country seemed to be limited to a few small gum trees, shrubby acacia, and triodia, with an occasional patch of grass. At the camp the bed of the creek was about 40 yards wide, with banks 15 ft. high, the general course n.w., which renders it probable that it flows to Cambridge Gulf.

*March 27.*—At 6 left the camp, and steered a course N.  $60^{\circ}$  E., gradually ascending among hills of chert and sandstone till 8·20, when we reached the level table land. The principal trees were white gum and silver-leaved ironbark; the soil red loam, of varying quality, well grassed, but with patches of triodia, which affects a sandy or stony soil. The country was now so nearly level that scarcely any rise or fall was discoverable, though the aneroid showed slight undulation. At 1·55 halted for an hour, and at 6 camped in a patch of green grass, which enabled the horses to feed, though they had no water. The weather was clear and hot during the day, with a light easterly breeze, the night cloudy and very warm.

*March 28.*—At 5·10 resumed our course N. 60° E., through a grassy forest of ironbark and bloodwood, with patches of small acacia and triodia. At 7·45 entered a series of open plains covered with high grass: these plains continued to 11, when, passing through an open gum forest, the country declined to the E., and at 11·15 came to a small watercourse, which was dry and sandy; this was followed to the N.E. till 11·40, when it passed through a rocky gorge in a steep sandstone ridge, which rose at an angle of 30° to the S.W., and 40° to the N.E.—the latter being the dip of the strata. In this rocky gorge we could see a pool of water, but it was quite inaccessible from that side of the ridge, and we had to make a considerable détour to the S. before we could descend to the plain below, and reached a fine pool of water, at the lower end of the gorge, at which we halted and watered our thirsty horses. As we were now only two hours' ride from the Dépôt Camp, we, after a short rest, started again at 3·10, and at 5·15 reached the Dépôt Camp, where we were welcomed by Mr. Baines and his party, and I was glad to find them all enjoying good health, and that the horses were in good condition. They had, however, been somewhat annoyed by the blacks, who had made frequent attempts to burn the camp, and also the horses, by setting fire to the grass, and, on some occasions, had come to actual hostilities, though by judicious management none of the party had been injured, nor was it certain that any of the blacks had been hurt, though it had been necessary to resort to the use of fire-arms in self defence, and for the protection of the horses.

*March 29.*—Returned our surplus provisions into store, when we found that the pieces of pork originally 4 lbs. weight were reduced to 1 lb. each, as the long continuance of heat had melted the whole of the fat; our ration had, therefore, been 1 lb. of flour,  $\frac{1}{2}$  lb. of pork, 2 oz. of sugar per diem each. Mr. H. Gregory and Bowman rode out to round up the horses.

*March 30, Sunday.*—The weather continues calm and cloudy, and though the temperature is not high, the heat is very oppressive.

*March 31.*—Examining and packing stores in readiness for the exploration of the country to the E. of the dépôt. The stores were in good condition, though the white ants had injured many of the bags. Although, in some respects, it would be more convenient to move the party at once to the bank of the Victoria before examining the country beyond, yet, as the horses are now accustomed to the run near the dépôt, and the huts and stock-yard rendered the station a more safe and convenient spot than we could elsewhere select, it appeared best to leave the party at the present camp until I had explored the country to the E., and then move the whole party down the right bank of the river, by

which the number and magnitude of the tributaries from the E. would be ascertained, and this was an important point with reference to the contemplated journey to the Gulf of Carpentaria.

*April 1.*—Preparing equipment for a light party to explore the country to the E. of the camp. Shod 6 horses, and packed 18 days' provisions for 4 persons. The weather continues cloudy, with light variable winds.

*April 2.*—At 6.45 started from the *dépôt* with Mr. H. Gregory, Mr. Baines, and John Fahey, taking 6 horses and 18 days' provisions, &c. Steered E. over an undulating grassy country of basaltic formation, with occasional ridges of sandstone; the soil was generally good, but very stony. I had before traversed this country, and as the weather was very misty, with much rain, nothing worth farther record was observed. At 1.30 altered the course to E.S.E., and at 3.15 camped on a large creek trending N.E., in the bed of which were large pools of a permanent character. (*Camp a.*) The hills were basaltic, but the valleys of the creeks having been cut through this rock into the sandstone, they were not of such a fertile character as the plains and ridges. Timber was wholly absent, and only a few small trees were seen at intervals on the hills. The morning was cloudy, with light rain, but it cleared towards sunset.

*April 3.*—Resumed our route at 6.30, and steered E.S.E. to a basaltic hill, which was reached at 7.40. From the summit a great extent of country was visible, but there were no marked features, as the broken ranges and isolated hills were very similar to each other. The whole country appeared to be a basaltic plain, with masses of sandstone rising 100 to 200 ft. above the general level, while the valleys of the creeks were excavated to the depth of 100 ft. The country was well grassed, but very stony; but this, though inconvenient to the traveller, does not render it less valuable for pasture, as stony land always stands feeding better than any other. At 8.20 altered the course to nearly E., towards a low ridge of hills. The plain was well grassed till 12.50, when the sandstone prevailed on the surface, and triodina replaced the grass. At 1.50 followed down a rocky gully, and at 2.15 encamped. (*Camp b.*)

*April 4.*—At 6.15 left the camp, and followed the gully to the E.S.E. At 7 crossed a sandstone ridge, and beyond it a large creek from the S.W., in the bed of which there were some fine pools of water. We then ascended to a basaltic plain, and altered the course to S.E. at 8; the country gradually declined to the E., and the sandstone prevailed, but grass was abundant. At 9.40 reached the Victoria, the course from S.S.W. to N.N.E.: the river had ceased to run, and was now only in large pools. Crossed to the right bank, steering S. half an hour, and camped on the

bank of a creek from the s.s.e. (*Camp c.*) At noon the sky was overcast, and at 2 it commenced raining, and continued till 4.30, accompanied by heavy thunder: heavy dew at night. After it commenced raining the aneroid fell 0.10, but rose again before it ceased. In this part of Australia neither wind nor rain appear to affect the atmospheric pressure to any great extent.

*April 5.*—The result of the rain was a thick fog this morning, and when we left the camp at 5.50 we could not see 100 yards, but we traversed the basaltic plain on an e. course till 7, when the fog cleared away, and we found ourselves at the foot of some low rocky hills of basalt, over which we travelled N.  $70^{\circ}$  E. These hills were very rough and stony, but covered with excellent grass. We then entered a basaltic plain, richly grassed, and less stony than usual. At 9.30 crossed a basaltic ridge, and entered a large valley trending to the N. and E. At 10.10 ascended a hill about 150 ft. high, and got bearings of the ranges, &c. The country appeared to consist of grassy hills and plains, extending 20 to 30 m. to the N. and E. In the S. a range of basalt and sandstone hills intercepted the view. Steered E. from the hill, and traversed an undulating country, the rocks being basalt, sandstone, chert, and jasper, basalt forming the higher ground, though the jasper rested on the basalt on the banks of the creeks. At 2.10 encamped on a large creek, with a gravelly channel 20 yards wide. (*Camp d.*) Fahey obtained a large quantity of mussels from the pools in the creek, and they proved an excellent addition to our supper, though rather deficient in flavour. The weather was cloudy, and though the sun was occasionally visible, we could observe neither the commencement nor end of the solar eclipse; I was, therefore, unable to avail myself of it for correcting the longitude.

*April 6.*—Left the camp at 6.10, and steered E. over a grassy plain. At 7.25 crossed some wide channels from the s.e., forming a large creek. At 8.15 turned s.e., and followed the creek till noon; it then turned S., and at 12.15 camped at a shallow pool of muddy water. (*Camp e.*) The creek was here divided into several small channels, in which only a few small pools of water remained. The whole of the country traversed this day was nearly level, well grassed, and very open. Basalt and jasper are the prevailing rocks.

*April 7.*—As the creek appeared to come from the S., and not to have a long course, but to rise in the low sandstone ranges which were visible in that direction, it was useless to follow it farther, and therefore steered northwards, to intercept any streams which might join the Victoria lower down its course; and after travelling over open grassy ridges of basalt for 6 hours, at 12.25 camped at a small gully, in which there were some pools of water,

which appeared to be supplied by springs. (*Camp f.*) The country, from 5 to 10 m. to the E. of the track, seemed open and grassy, basalt forming the prevailing rock.

*April 8.*—At 6 left the camp, and steered an average w.s.w. course over an undulating grassy country of basaltic formation. At 11.45 reached the bank of the creek, which formed fine pools 50 yards wide, with fine open grassy country on both sides, well suited for stock. Followed the creek N. by W. till 1.5, when we encamped on the left bank. (*Camp g.*) The morning was calm and hot, but it clouded over in the afternoon, and there was a slight shower at 3 p.m.

*April 9.*—Continued route down the creek in a northerly direction from 6.15 till 7.55, when we reached the junction with the Victoria River. The river had high banks, and formed deep reaches of water, with a dense growth of *Pandanus melaleuca* and flooded gum trees in the dry portions of the channel. The country on both banks was basaltic, and rose gradually into fine grassy downs; the soil very stony, but good sandstone was exposed where the river had cut through the basalt, which is not of very great thickness. At 2.35 camped on a back channel of the river, as the principal channel was difficult of access, from the steep banks and dense growth of the reeds. (*Camp h.*) Although the upper part of the Victoria has long ceased to flow, this part of the river is running with a strong current 10 yards wide and 6 ft. deep.

*April 10.*—Continued our route at 6.5, and steered northward along the course of the river till 8.10, when it turned to the N.W. The country consisted of nearly level grassy plains of various elevations, separated by low rocky ridges of basalt and sandstone, the whole well grassed, except some small patches, where triodia prevailed. At 11 altered the course to average N.W. by N., and at 1.30 camped on a small gully, with a little water from a recent shower. (*Camp i.*) At 11.40 there was a shower of rain, and the temperature was reduced from 95° to 84°.

*April 11.*—Started at 6.30, steering W.N.W. At first sandstone prevailed, and triodia replaced the grass; but at 2 m. entered the basaltic country, which was well grassed, but very stony, and formed flat topped hills of small elevation. The basalt appeared to be interstratified with sandstone, which was much altered at the line of contact. At 9.15 came on the bank of the river, which was running strong in a deep channel, with a dense line of pandanus, fig-trees, flooded gum, melaleuca, and terminalia, &c., on the banks. Followed the valley of the river N.W. till noon, and camped at the foot of the hill which we had ascended, at the most southern point attained in December, 1855. (*Camp k.*) Ascended the hill, and took bearings as on the former occasion; the rain had obscured the features of the country.



*April 12.*—Having connected this part of our route with that of December last, at 6:20 commenced our return up the river, crossing to the left bank at 7:15. The water was running strong, 20 yards wide, and 2 ft. deep. In examining the ford my horse trod on the back of a large alligator, which seemed to be equally astonished as the horse at their unexpected meeting. I then proceeded up the river  $1\frac{1}{2}$  m., and halted for Mr. H. Gregory, whom I had sent to examine the river lower down for a ford, and he shortly after overtook us, having found a better crossing over the river. At 4 resumed our journey, and at dusk encamped in the bed of a large creek which joined the Victoria from s.s.w. (*Camp l.*) At 7 it commenced raining, and there were frequent showers with thunder and lightning till midnight. As the creek on which we camped seemed to come from the s.w., we followed the valley in that direction at 6:40: the hills receding, the grassy flats seemed to extend to the banks of the Wickham and form a continuation of Hutt Plains. The creek now came from s.s.w. and had some fine pools of water in the channel. At 2:10 camped at a shallow pool in the grassy flat, as the water in the creek was not easy of access from the dense mass of reeds and grass on the bank. (*Camp m.*) The hills which bound the valley of the creek are of sandstone, chert, and basalt, with very few trees; the flats near the creek brown loam, and covered with grass 5 to 9 feet high, which greatly impeded the horses.

*April 13.*—The aneroid barometer was completely thrown out of adjustment by the principal lever having been moved from its position by a violent jerk in crossing one of the gullies.

*April 14.*—At 6:10 resumed our journey up the creek in a southerly direction, the valley gradually narrowing, and in one part the sandstone rocks came close to the bank of the creek, leaving scarcely space to pass between them and the deep pools of water. (*Camp n.*) At 12:30 camped on the right bank; the basaltic hills appeared to turn to the s.e., and we now entered the sandstone country. The valley of this creek appears to offer the best access to the upper part of the Victoria, as it is nearly level from Hutt Plains to 10:40 on this day's journey, beyond which point drays would have to ascend the hills and turn to the s.e. to reach Roe Downs, which are the finest part of the country yet examined. A short distance below the camp we saw several native paintings on the rocks. They consisted of rude outlines of men, fish, and snakes, some in red ochre and others in white clay. Mr. Baines sketched some of the most remarkable.

*April 15.*—At 6:15 recommenced our journey, and followed the creek, which turned to the w., and the country became so extremely rugged that the valley was impassable, and we had to ascend the hills, steering s.w., across very rocky sandstone country,

to the basaltic plains, then changing the course to w.n.w. At 3.40 camped on the bank of the creek, which was much reduced in size. (*Camp o.*) The country to the north of the creek consisted of very rough and rocky hills of red sandstone, extremely barren in appearance, while on the south it rose into the basaltic plains which form Roe Downs.

*April 16.*—Resumed our journey at 6.45, and travelled on a w. by n. course towards a remarkable basaltic hill, which I called Mount Sanford, traversing a fine open grassy country till 1, when we encamped on a creek with permanent pools of water. (*Camp p.*) The rough, stony ground has rendered the horses quite footsore, and their legs are much cut and bruised by frequent falls over the rocks in crossing the deep ravines and rocky ridges.

*April 17.*—Started at 6.25, and reached Mount Sanford at 7.30, the country passed being sandstone, producing triodia and a little grass. The hill is of basalt, with a flat top, in form nearly a truncated cone, 150 ft. high and 300 ft. diameter at the top. Having taken angles to the surrounding hills, descended and steered s.w. and w. to the depôt camp, which was reached at 1. (*Depôt Camp.*) During our absence Dr. Mueller had found full employment in collecting the plants in the vicinity of the camp, and the rest of the party had been occupied in the care of the horses and duties of the camp, and I was glad to find that they had not been again molested by the blacks.

*April 18.*—Preparing maps of the late route to the east of the depôt. Party preparing for the return to the principal camp.

*April 19.*—Party employed as before.

*April 20, Sunday.*—A fine cool breeze from the s., with thin clouds.

*April 21.*—Several of the horses had strayed some distance from the camp, and we did not start till 12.30, when we steered n. by w. till 5.15, when we camped at a small creek in a deep rocky valley. The country after leaving the basaltic plain was very rocky, the hills composed of chert with a superstratum of red sandstone; grass was abundant in the valleys, but the hills produced little besides triodia and a few small gumtrees.

*April 22.*—At 6.45 steered e. 1 m. down the creek to its junction with Depôt Creek, which was followed n. and n.n.e. till 8.40. The back country rose into sandstone hills covered with triodia, but there were good grassy flats on the bank of the creek. The creek then entered a rocky gorge about 100 yards wide, with cliffs of red sandstone upwards of 100 ft. high on each side. With some trouble we forced our way through the reeds, brushwood, rocks, and pools of water till 10.10, when a more open part of the valley was reached. The creek now turned e.n.e., and the wide valley was bounded by low chert hills on the n. and the

sandstone range just passed on the s. Except in the lower part of the valley and a few patches on the hills, the country was very poor and stony, triodia taking the place of the grass. Water was abundant in the bed of the creek, forming large pools, between which there was a small stream of water in the upper part of the creek, but lower down the channel was dry between the pools. At 1 camped on the right bank of the creek.

*April 23.*—Crossed to the left bank of the creek at 6·20, and followed it N.E. 1 hour, when the creek turned E., and our course was over stony ridges. It was now found that one of the pack-horses had been lost in the dense thickets in the bed of the creek. Mr. H. Gregory therefore returned to search for the lost animal, and the party halted till 9·20, and then went on, leaving Mr. Baines to wait on the track till Mr. Gregory came up. At 10·20 reached the Wickham river, and followed it down to the junction of Dépôt Creek, which we crossed at noon, and camped in a grassy flat about a mile lower down. At 2 Mr. H. Gregory and Mr. Baines came into the camp, but had not been able to find the missing horse; at 3 Mr. H. Gregory started again with Bowman to look for the lost packhorse.

*April 24.*—At 10·30 Mr. H. Gregory returned with the packhorse lost yesterday; fortunately the horse was not carrying a load, and though the saddle had got under its belly nothing was injured.

*April 25.*—Followed the river down from 7·40 till 2·30, and encamped. At 9·10 crossed a large tributary creek from the s.; the country was grassy near the river, but rose into rocky hills with flat tops at a short distance from it. Light rain from 4 A.M. to 1 P.M., with gentle breeze from the E.

*April 26.*—Continued the route along the right bank of the Wickham from 7·45 till 3·15, and encamped. The general course E.N.E. After passing the gorge in the sandstone range, which was very rocky and narrow, the country opened into level grassy plains. The best line of route to the upper valley of the Wickham is near Mount Warburton, as the sandstone hills which form the gorge are detached. The day was cool and cloudy, with a strong easterly breeze in the morning, and it commenced raining at sunset.

*April 27.*—At 7·25 left the camp and steered E. to the Victoria River, but, as we could not find a fording-place, turned N. to the Wickham, and encamped on its bank at 11·25, the bank of the Victoria being so thickly covered with reeds that the water was not accessible. In the afternoon I rode out with Mr. H. Gregory to search for a ford, as I wished to keep on the right bank of the river to ascertain what tributary streams joined from the east. After 3 hours' search found a practicable ford, and

returned to the camp after dark. In the afternoon the blacks were heard calling on the left bank of the Wickham near the camp, but were not seen, owing to the thick brush and trees in the bed of the river.

*April 28.*—At 7·25 steered s. to the Victoria, and reached the ford at 8·25, and at 9 had accomplished the passage of the river with only a few slight accidents; then followed it downwards till 1·15, and encamped. On the eastern side of the Victoria the country was level and well grassed for several miles back, and then rose into the sandstone range to the s. and basaltic hills to the e.

*April 29.*—At 7·10 steered n.e. over a thinly wooded and nearly level grassy, basaltic country, with low hills to the e. of our route. At 8 altered the course to n., and traversed a fine grassy country, with table hills of basalt resting on chert and sandstone. Crossed one creek from the s.e., with a muddy channel 15 yards wide. At 2 changed the course to n. 300° e., and at 4·15 reached the bank of the Victoria, but it was too steep for the horses to approach the water, and therefore followed the river to the rocky ford e.s.e. from Mount Sandiman, and encamped.

*April 30.*—Crossed to the left bank of the river at 7, but one of the horses injured his leg among the rocks and the wound had to be sewn up, which delayed us till 8·20, when we steered n.w. to Jasper Creek, which, after much labour in forcing a passage through the reeds, we crossed at 11·25, and at 12·55 camped on the bank of the Victoria at the commencement of the rocky gorge through Stokes Range.

*May 1.*—Proceeded down the river, leaving the camp at 6·50, and at 12·15 camped a short distance above our camp of the 8th of December, 1855.

*May 2.*—Continued route from 6·45 till 1, and camped 1 m. above the bivouac of 28th of November last.

*May 3.*—Resumed our journey at 6·45, and followed the left bank of the river till 10·10, when we encamped at the spot where we crossed the Victoria on the 28th of November. At 2 crossed the river with Mr. H. Gregory, and rode to the e. to examine a large creek which joined the Victoria River about 2 m. below the camp. This creek was 30 to 40 yards wide, with high muddy banks covered with reeds and grass. The marks of floods were 50 ft. above its present level, and the general appearance that of a stream having a course of 40 to 50 m. The wide flat on the left bank of the creek was covered with high grass, but the valley was bounded by steep sandstone hills covered with triodia and scrub. Returned to the camp at 5.

*May 4.*—At 6·50 left the camp, and followed the same track

as in December last, and at 11 camped at the spot where we had halted at noon on the 10th of December; the flats of the river were covered with grass 3 to 7 ft. high, which greatly impeded our progress. In the afternoon crossed the river, and examined a creek which joined it about  $\frac{3}{4}$  m. above the camp. It proved to be of no importance, only draining a valley which extended a few miles to the N. The ford at this camp is good, the bed of the river about 100 yards wide, but only 20 yards were occupied by running water, which was about 1 ft. deep, but the river formed fine deep reaches above and below.

*May 5.*—It being of importance that we should ascertain whether any large branch joined the river in the short space which remained unexamined of the right bank of the Victoria, I proceeded, with Mr. H. Gregory and Mr. Baines, down the right bank to the commencement of Bynoe Range, but only found one large creek, and that not of sufficient importance to be worthy of special examination, as from its direction it appeared to drain the country for about 20 m. to the N.E. This confirmed the view I had taken of the probable result of the general dip of the sandstones to the E., which was that the Victoria would occupy the eastern part of the valley, and that all the larger tributaries would join from the westward. Returned to the camp at sunset.

*May 6.*—As we should have to pass this camp on the route to the Gulf of Carpentaria, I deposited 100 lbs. of flour and a quantity of shot, lead, horse-shoes, &c., in a cleft in the rocks and concealed them with large stones, and then set fire to the grass to deface our tracks. At 8.15 left the camp, and proceeded along our former track till noon, and encamped on a small creek 2 m. E.S.E. from Bynoe Range.

*May 7.*—Left the camp at 8.10, and steered N.  $240^{\circ}$  E. over a level country, wooded with *Bauhinia*, *acacia*, and *eucalyptus*, the latter being more frequent as we advanced. At 1 the country changed to low rocky ridges of chert and limestone. At 2 camped at a small creek trending N.W., in which a few small muddy pools of water remained. At noon we passed a party of five or six blacks, who shouted to us from a distance, but would not approach within 200 yards. They were armed with spears, and seemed to be on their return from hunting, as the grass was on fire to the S.

*May 8.*—At 7.20 resumed our journey, and, steering W., crossed a fine creek with deep pools and water pandanus growing on the banks, then traversed a very rocky country at the southern base of the sandstone range till 11, when we came to a more level and grassy country, consisting of chert ridges. At noon steered N.  $300^{\circ}$  E. down the valley of a small creek, and soon entered a deep valley, bounded on both sides by steep sandstone ranges.

At 1 changed the course to  $320^{\circ}$ , and at 2-20 camped at a shallow pool in the bed of the creek which was worn in the limestone rock.

*May 9.*—At 7-30 resumed our journey down the valley to the junction of the creek with the Victoria River, which we followed down, crossing the ridge at Steep Head at 10 20, and reached the *Principal Camp* at 3-30, where we were welcomed by Mr. Elsey, who was in charge, Mr. Wil-on being absent down the river at the schooner, which had been laid on the shingle bank near the "Dome" to complete repairs. All the men attached to the expedition were in good health, except Henry Richards, whose hand was still in a very unsatisfactory state, though better than when I left in January. The crew of the schooner had not been so fortunate, as the carpenter, John Finlay, had died, and three of the men were so ill that they had been left at the camp to be under the immediate care of the medical officer. This amount of sickness is to be ascribed to the combined effects of previous disease and the inferior quality of the provisions with which the vessel is supplied. It appears that through damage by salt water and want of good management, the provisions which should have been sufficient for two years are now reduced to salt beef of inferior quality and tea, the expedition having had to furnish flour, rice, sugar, peas, and pork, as also medical stores for the sick men. In consequence of the reduced number of the crew of the *Tom Tough*, Mr. Wilson had found it necessary to furnish men to assist in working the schooner, as well as to effect repairs.

*May 10.*—Much of the grass near the camp having been burnt, I sent the horses to the creek 3 m. above the camp. Party employed in the general duties of the camp. 29 sheep now remain; they are in fair condition, and average 40 to 45 lbs. The natives have been frequently at the camp in small parties, and on these occasions were very quiet in their demeanour, but had made hostile demonstrations when met by small detached parties of the expedition, and on one occasion Mr. Wilson had deemed it necessary to fire at them, but only one of the blacks appears to have been wounded with small shot in the arm, as he was afterwards seen at the camp.

*May 11.*—Sunday.

*May 12.*—Preparing maps, arranging stores, &c.

*May 13.*—Preparing maps of the late journey. Arranging equipment for explorations towards the Gulf of Carpentaria.

*May 14.*—Preparing maps. Sifting flour, packing specimens, burning charcoal for the forge, preparing horse-shoes, &c. At 6 p.m. Mr. Wilson returned in the boat from the *Tom Tough*, and brought one of the boys belonging to the schooner's crew to

the camp for medical treatment, as he was suffering from scurvy. The *Tom Tough* had been moved below the shoals, and was now moored in a secure position below Curiosity Peak; all the leaks had been secured, and she now only makes about  $\frac{1}{2}$  an inch of water per hour. The crew of the vessel have been so much reduced by sickness that it will be necessary to send men on board to assist in refitting the schooner, and procuring a supply of wood and water. As it is necessary to replace the stores destroyed or damaged by salt water, it appears desirable that the *Tom Tough* should proceed to the Gulf of Carpentaria via Coepang in the island of Timor, where a supply of rice and sugar can be procured for the expedition, and the vessel will be enabled to complete her stores. It is desirable that the land party should refit with all possible despatch for the journey to the Gulf of Carpentaria, in order to take advantage of the cool season, and there is reason to expect that the horses will be sufficiently recruited in strength by the end of June: I am, therefore, in hope that the party will be able to leave the Victoria before the expiration of the ensuing month. A small body of natives came to the camp this morning, and after bartering a few trifles retired.

*May 15.*—Continued plotting maps. Party preparing equipment for the journey to the Gulf of Carpentaria. Camp duties, and picking oakum for the schooner. Having found that the pork had been so much reduced in weight during the last journey, I made some experiments in the preparation of meat biscuit by mixing the preserved beef with flour in equal quantities: the result was very satisfactory, and the reduction in weight by baking was 33 per cent.

*May 16.*—Party employed as before.

*May 17.*—Party employed as before.

*May 18.*—Sunday.

*May 19.*—Messrs. Wilson, Elsey, and Mueller being desirous of proceeding up Baines River to collect specimens, &c., arrangements were made for this purpose, and they proceeded in the boat with Phibbs, Humphery, and Shewell, to the schooner. The men were then to return to the camp with a cargo of stores, and Messrs. Wilson, Elsey, and Mueller were to proceed up the river in the small boat to be obtained from the schooner. Richards is in charge of the sheep; MacDonald cook for the week; Bowman and Melville in charge of horses; Dean is making saddlebags and harness; Fahey and Selby in burning charcoal and in general camp duties.

*May 20.*—Party employed as before. The weather continues fine, with southerly winds.

*May 21.*—Party employed as before.

*May 22.*—Party employed as before. At noon the boat returned from] the *Tom Tough* with stores. Captain Gourlay came up in the gig to the camp, and informed me that the schooner only makes 10 inches of water per day, and that she would be ready for sea as soon as the upper seams were caulked. He considered her perfectly seaworthy for the purposes of the expedition.

*May 23.*—Party employed as before.

*May 24.*—Despatched the boat to the schooner with 3 cases of stationery, tobacco, clothing, &c. Captain Gourlay returned to the *Tom Tough*. Party employed as before.

*May 25.*—Sunday.

*May 26.*—Party employed preparing equipment for the expedition to the Gulf of Carpentaria, &c.

*May 27.*—As before.

*May 28.*—As before.

*May 29.*—As before. Messrs. Wilson, Elsey, and Mueller returned with the longboat and gig from the schooner, having been about 30 m. up the river to the s.w. of Curiosity Peak. Mr. Wilson brought a native in the boat from Stony Spit.

*May 30.*—Party employed as before, and packing stores to be sent on board the schooner.

*May 31.*—Party employed as before.

*June 1, Sunday.*—*Principal Camp* on the Victoria River. (Lat. 15° 34' s. Long. 130° 22' E.)

*June 2.*—The party employed preparing saddlery and equipment for the journey to the Gulf of Carpentaria.

*June 3.*—Mr. Baines proceeded with the boats to the *Tom Tough*, which was now anchored below the shoals in the Victoria River. Sent down sundry stores, &c., to the vessel; boat's crew consisting of Messrs. Phibbs and Humphery, Dawson and Selby. The remainder of the party employed as before. Preparing maps of the route up the Victoria River, &c., &c.

*June 4.*—The party at the camp employed as before, viz. shoeing horses, stuffing saddles, and other preparations for the journey to the Gulf of Carpentaria. Received from Mr. Wilson a journal of his proceedings from Jan. 31 to March 3, and April 1 to May 14, 1856.

*June 5.*—Party at the camp employed as before. Mr. Baines returned with the gig; boat's crew, overseers Phibbs and Humphery and Dean, Dawson and Selby, also one of the seamen belonging to the vessel. Mr. Baines informed me that on the 4th instant he had landed early in the day from the schooner, in company with Captain Gourlay, Dawson, and one of the seamen, Adams, for the purpose of bartering with some blacks, about 20 in number. The natives having been allowed to approach the



boat, stole a tomahawk, and on Adams making a demonstration of detaining one of their number till the stolen article was returned, one of the blacks seized his gun and tried to wrest it from him, but Captain Gourlay approaching him he ran away into the surf, and the rest of the blacks retired: the party then returned to the schooner. The axe was afterwards found in the water near the spot where the boat landed.

*June 6.*—Party employed as before. The shoeing of the horses progresses rapidly, Mr. H. Gregory and Bowman completing 5 horses each day, although some of the horses are very restive.

*June 7.*—Mr. Elsey proceeded in the gig with Phibbs, Humphery, Selby, and Adams, conveying the two sick men and boy belonging to the crew of the schooner to that vessel. Party employed as before, shoeing horses, baking meat biscuits, &c., &c. Heavy showers of rain at night.

*June 8, Sunday.*

*June 9.*—Completed shoeing the horses. Party employed making small tents and saddle bags, fitting pack saddles, baking meat biscuit, &c. Dr. Mueller collecting and arranging botanical specimens.

*June 10.*—Party employed as before and preparing extra shoes for the horses, &c. Mr. Elsey returned with the gig from the *Tom Tough*; boat's crew, Phibbs, Humphery, and Selby. The sick men had reached the vessel without any serious difficulty, although the boat had grounded on the banks and had thereby been detained till the next tide, and they were thus exposed for several hours in the rain.

*June 11.*—Party employed as before.

*June 12.*—Completed baking 300 lbs. of preserved beef and 300 lbs. of flour into meat biscuit, which weighed 480 lbs. when quite dry; 6lbs. of flour was added to each 6 lb. tin of preserved beef with the whole of the fat and gravy, and 1 oz. of salt (no water being required), the whole worked up into a stiff dough, and baked in the ordinary form and size of sea biscuit, the whole weight of which was 8 lbs. Thus  $1\frac{1}{4}$  lb. was equal to 1 lb. of meat and 1 lb. of flour.

*June 13.*—Mr. Baines proceeded with MM. Phibbs, Humphery, and Selby in the gig to the *Tom Tough*, with stores not required for the use of the camp, and to bring up soap and other stores required for the outfit of the land party. Party at the camp preparing equipment as before. Mr. Wilson completed and furnished to me a sketch of the western branch of the Victoria River. Preparing maps, &c. for transmission to the Governor-General of Australia.

*June 14.*—Wrote to the Governor-General of Australia reporting progress of the North Australian Expedition. Party employed

as before. The spare set of harness were completed and fitted to the horses.

*June 15, Sunday.*—The weather has become very cool and clear, the thermometer ranging from 48° to 52° at sunrise.

*June 16.*—Mr. Baines returned from the schooner with the gig and long boat, bringing the stores required to complete the equipment of the land expedition. Party employed as before.

*June 17.*—Preparing copies of letters to the Governor-General of Australia for transmission to the Secretary of State for the Colonies. The party preparing equipment, &c., for the journey to the Gulf of Carpentaria.

*June 18.*—Party preparing equipment, &c.

*June 19.*—Wrote to Mr. Baines, instructing him to take charge of the portion of the expedition which would proceed in the *Tom Tough* to the Albert River. Party preparing equipment.

*June 20.*—Wrote to the master of the *Tom Tough* schooner instructing him to proceed to Coepang for supplies, and thence to the Albert River. Wrote to Mr. Baines two letters of instructions. Fitted the saddles and inspected the equipment of the party proceeding over land to the Albert River.


*June 21.*—At 10 A.M. left the camp on the Victoria with a party consisting of Mr. H. Gregory, Dr. Mueller, Mr. Elsey, Robert Bowman, Charles Dean, and John Melville, with 7 saddle and 27 packhorses, conveying 5 months' provisions of salt pork and meat biseuit, and 6 months' supply of flour, tea, sugar, coffee, &c. 26 lbs. gunpowder, 60 lbs. bullets, 100 lbs. shot, 5000 percussion caps, &c. Proceeding up the left bank of the river, crossed the ridge at the back of Steep Head, and at 3.15 P.M. camped about  $\frac{3}{4}$  mile above it, on the bank of the river. (*Camp I.*)

*June 22, Sunday.*—At 7.30 A.M. left the camp, following the river for 10 m. and then a small tributary creek for 4 m. to the S.S.E., but the country proving very rocky returned 1 m. down the creek and encamped at 3 P.M. (*Camp II.*)

*June 23.*—Left the camp at 7 A.M. and returned down the valley of the creek to the river, and followed the Victoria to the junction of Beagle Creek, which we ascended 5 m. and camped at 11 A.M., as there was no water on the Beagle Valley route between this point and the bend of the Victoria at Bynoe Range, a distance too great to be commenced at this late hour of the day. (*Camp III.*)

*June 24.*—Started at 7 A.M. and E., through an open box forest nearly level and well grassed; the grass had been burnt off by the blacks, but had shot up to a foot in height. Passed, to the S. of the Fitzroy Range, the valley between it and Stokes Range, very similar to Beagle Valley and about 4 m. wide. Keeping close to Stokes Range, passed between it and some of the outlying

hills, and at 4.20 reached our old camp of the 5th of May, and found the stores we had then secreted in the rocks undisturbed. (Camp IV.)

June 25.—Having distributed the stores left here in May among the several packhorses, at 7.15 A.M. resumed our route up the river and crossed to the right bank 2 m. above the creek we intended to ascend, and camped at 11 A.M. (Camp V.) Marked a large white gum-tree  V.

June 26.—Left the camp at 7 and followed the creek upwards to the E.S.E. for 5 m. The valley was about 1 m. wide, with fine grassy flats, bounded by sandstone cliffs 50 to 200 ft. high, and forming table land with deep ravines. The valley now turned to the E. and E.N.E. Some small tributaries joined the creek from the S.E., the sandstone cliffs disappeared, and the hills were rounded in their outlines, rising about 300 ft. above the creek. Shallow pools separated by dry banks of shingle and an occasional deep water hole characterised the channel of the watercourse. At 1.30 P.M. camped on the left bank of the creek in an open flat well grassed. The higher land very stony and inferior. (Camp VI.)

June 27.—The temperature was lower this morning than on any other day since we landed on the N.W. coast of Australia, being only 41° at sunrise: there was a little dew on the grass, and a light air from the E. At 6.30 started and followed up the creek to the E.N.E. till 1, when we camped at a deep pool of water 20 yards wide and 200 yards long. Our attempts to procure some fish were unsuccessful. (Camp VII.) The country consists of low stony hills thinly wooded; and the flats of the creek, from  $\frac{1}{2}$  to  $\frac{3}{4}$  m. wide, were well grassed. On the north side of the valley a few miles back the hills rose to a greater elevation with flat tops, some with sandstone cliffs near the summits, and others with smooth grassy slopes: the latter from the colour of the grass appeared to be of trap formation, and fragments of that rock were found in the bed of the creek. Soft shales were exposed in the gullies on the sides of some of the hills, and were overlaid by hard grey sandstone.

June 28.—Left the camp at 7.15, and followed up the creek to the E.N.E. till noon, when reaching the last water in its diminished channel, camped near a steep range of sandstone hills or rather table land. (Camp VIII.) The country traversed was an undulating plain of trap formation resting on grey sandstone. The country is thinly wooded and well grassed, water abundant in the creek below the camp, but above the channel was dry and soon terminated in small gullies. In the afternoon ascended a hill about  $\frac{3}{4}$  m. N.W. of the camp: the lower part was compact dark trap or basalt, and the summit a horizontal bed of sandstone, 250 ft. above the camp. The view to the N. was over very level

country, occasionally interrupted by flat-topped sandstone hills, some 30 in. distant. To the s. and s.w. a level country of trap formation extended for 20 m., and to the E. the level table land rose 300 ft. above the camp, and was composed of the same strata as the hill ascended, but surmounted by a thin bed of ferruginous conglomerate, which is the upper rock of the new red sandstone series.

*June 29.*—At 6·45 left the camp with Mr. H. Gregory to reconnoitre the country to the E. Ascending the table land steered E. till 10·10 through a level forest of stringy bark and other eucalypti; the soil a light gravelly loam, but well grassed. We then steered N.E. 1 hour along a shallow watercourse, and then E. again through the forest till 3·20, when we reached a small stream-bed trending N.N.E.: tracing it through grassy flats which were on fire, at 4·40 found a small pool of water, at which we halted for the night.

*June 30.*—As this appeared to be a spot to which the party could be advanced with safety, we left our bivouac at 6·50, and returning across the table land reached the camp at 4·30. (*Camp viii.*)

*July 1.*—At 6·40 A.M. steered an average course of 80° magt. and reached the water-hole in the creek at 3·30 with the whole party, and camped at our bivouac of the previous night. (*Camp ix.*)

*July 2.*—At 6·40 left the camp and followed the creek down to the E.N.E. till 11. It then turned more to the northward, and was nearly lost in wide level flats covered with high grass. The back country a level stringy bark forest with good grass. At 2·25 the channel of the creek was again collected into one, and we found a water-hole 20 yards long and 4 ft. deep, at which we camped. (*Camp x.*) Here we observed the fires of a party of blacks who had camped at the water-hole the previous day. Several heaps of mussel shells lay at intervals on the banks of the creek, though the channel was perfectly dry, but it appears that the last wet season has been unusually dry, and the soil has not been fully saturated, and consequently the water-holes have dried up sooner than in average years. Although from the geological structure of the country we are now evidently on the table land which divides the waters flowing to the N.W. coast from those which fall into the Gulf of Carpentaria, yet the elevation does not exceed 800 feet.

*July 3.*—Starting at 7·30 A.M. followed the creek N.E. by E. to 8·35, when it was joined by a small creek from the S. Thus increased in size, water was abundant in the bed of the creek, but the pools were shallow, and not permanent. Grassy flats extended a mile on each bank, beyond which was a level grassy forest of stringy bark and bloodwood. The soil a good red loam, and in a few spots fragments of limestone and agate were strewn over the

surface. An occasional ridge of ironstone was crossed, on which the grass was very inferior. At 12.45 camped in a wide grassy flat: the grass having been burnt early in the season, had sprung up fresh and green. (*Camp XI.*)

*July 4.*—We were again in the saddle at 7.10, and steering 70° magt. diverged from the creek, traversing a level stringy-bark forest with abundance of green grass. At 8 turned N.E., the forest become more open and the stringy-bark replaced by bloodwood and box; limestone was frequent and rendered the surface very rough, and frequent depressions of the surface appeared to result from the falling in of the roofs of caverns beneath, the existence of which was also indicated by deep clefts and holes in the rock, into which the surface waters flow during the rains. At 11 turned to the N., and at noon again came on the creek, which gradually turned to the N.N.W. Limestone formed the banks, and only one small pool of water was seen till 4.50, when we found a little water in the sandy bed of a tributary creek from the S.S.E., at which we camped. (*Camp XII.*) On the bank of the creek we this day saw, for the first time, the casuarina, which is so frequent on the creeks trending towards the Gulf of Carpentaria.

*July 5.*—As the course of the creek was to the N. and we had already been driven farther in that direction than was desirable, we left the creek and followed up the tributary to the E.S.E., leaving the camp at 7.5 A.M. The channel was soon lost on wide grassy flats, in one of which was a fine water-hole covered with nymphæa, and near which a party of blacks were encamped. On our approach the women decamped with their bags and mats, while the men stood with their spears gazing on the strange sight as we passed them. Continuing to follow the creek, the course of which was only marked by the vegetation showing signs of frequent inundations, it again formed an irregular channel in the centre of a wide grassy box flat, and at 1.30 camped at a small water-hole in the channel of the creek. (*Camp XIII.*)

*July 6.*—The small size of the creek affording little prospect of water nearer its source, and as Mr. H. Gregory was suffering from a severe attack of fever which rendered travelling unadvisable, I proceeded with Charles Dean to examine the country to the E.S.E. Leaving the camp at 7 A.M., steered 120°. At 8 crossed a sandstone ridge covered with acacia scrub, and again descended into the valley of the creek, passing some fine grassy plains. At 11 ascended the table-land, and passing a belt of acacia scrub, traversed a level flat covered with melaleuca scrub and small trees, and at noon entered a forest of stringy bark, with occasional patches of bloodwood, leguminous ironbark, and sterculia. The soil varied from brown loam to ironstone gravel, and in a few spots the ferruginous conglomerate was exposed on the

surface. On the loamy soil the grass was good, but on the gravel little grew but the spiny-leaved triodia. This table-land was so level that not the slightest declivity could be detected during the day's journey, which continued till 5.30, when we bivouacked without water. By taking the precaution of letting the horses feed on the track, and secreting ourselves after dark in the high grass, we were able to sleep in security without keeping watch after midnight.

*July 7.*—The horses having strayed back on the track, we took our saddles and followed their traces 2 m., and saddling them, rode to the northward for some miles, but not seeing any signs of water, turned to the s.w., crossing the outward track, and at length came to a shallow water-course trending w. A ridge of rocks confining the channel to a narrow space, three small water-holes had been formed, in which a little water remained. Below this the water-course trended s.s.e., and I again turned towards the camp; but the night overtaking us in the stringy bark forest, we passed to the s. of its position without observing it.

*July 8.*—Having ascertained that we had passed to the s. of the camp, steered n.e., and reached it at 11.20. Mr. H. Gregory was much better, but very weak in consequence of a violent return of the fever during my absence. A small party of blacks had visited the camp, and bivouacked a short distance up the creek.

*July 9.*—Moved the camp to the water-holes 12 m. to the s.e., and in the afternoon rode down the creek with Mr. Elsey.—(*Camp xiv.*) It first turned s.s.e. for  $1\frac{1}{2}$  m., and was lost on a level flat from which a channel trended to the w., which was again lost in a level flat extending several miles to the westward. Heavy rain at night.

*July 10.*—Accompanied by Mr. Elsey, I proceeded to reconnoitre the country to the s.e. At 7.45 steered  $130^{\circ}$  mag., gradually ascending the table-land, which was openly wooded with bloodwood, box, and white gum, acacia and sterculia occasionally appearing. The soil was a brown sandy loam, with a few ridges of sandstone rock of a white colour. Grass had been abundant, but was now burnt off. The small white ants' nests, from 2 to 5 ft. high, were very numerous. At 2.40 a slight depression of the country was observed, limestone appeared, and deep isolated hollows were frequent. In one of these hollows, which was 30 yards in diameter and 15 ft. deep, there was in the centre a chasm in the rock, 15 ft. deep and 3 ft. wide, extending to e. and w. At 3 struck a small creek trending e.n.e., with small pools of water in the channel. In following down the creek in search of a sufficient supply of water for the horses, we passed some blacks sitting at a fire; but they did not take any notice of us. At 3.30 came to a pool of sufficient size for the supply of the whole party, below which

the creek was dry. Returning to the pool we met the blacks following on our tracks; but observing us they ran away, and on being followed hid themselves. Having unsaddled the horses, we commenced our dinner, and soon saw the blacks watching us from their hiding places, and after some time spent in making signs, they were induced to approach, the eldest of the party feigning to weep bitterly till they got close to us. We then attempted to converse with them, and they appeared to recognise some few words of the dialect of the Victoria River. Their spears were formed of reed, with large heads of white sandstone, and also with wooden points for fishing. They were circumcised, and their front teeth were entire. At 5 steered to the w.n.w. for one hour, and bivouacked, taking the usual precautions to secure ourselves from attack during the night.

*July 11.*—At 6·20 resumed our route towards the camp, which we reached at 1 P.M., without having seen anything worthy of further remark.

*July 12.*—The grass near the camp having been burnt off, the horses had scattered very much and could not be collected and saddled before 10·10, when, following our track of yesterday, we reached the pool of water at sunset.—(*Camp xv.*) The country was so level, although we were crossing the water-parting between the Gulf of Carpentaria and the n.w. coast, that the aneroid only varied from 29·55 to 29·62, and even of this change much was due to the effect of temperature. The geological structure of this part of the country differs slightly from that of the Victoria River. The upper stratum is a bed of ironstone conglomerate, about 20 ft. in thickness. This rests on sandstone, the upper part of which is highly ferruginous, passing into a variegated sandstone imperfectly stratified, and then into a compact silicious sandstone, which is white, and breaks with a conchoidal fracture. This sandstone rests on a hard cherty limestone similar to that of the Victoria. In this rock many depressions occur, apparently caused by the falling of the roofs of caverns, as there are usually deep fissures in the rock at the bottom of these hollows, into which the surface-water runs during rain. In some places the sandstones resting on the limestone have sunk many feet below the general level, with areas varying from 1 to 10 acres, sometimes sloping towards a central point of depression 10 to 30 ft. below the plain, and in other cases they have abrupt rocky banks 3 to 8 ft high, and the bottom perfectly level. The level character of the country is unfavourable for investigations of this nature, and the thickness of the strata not easily determined; but the collective thickness of the strata above the limestone may be assumed at less than 100 ft. The porous nature of the limestone precludes the existence of surface-water by draining the whole of the upper part of the table-land, while it

causes strong springs in the lower ground to the E., where the limestone is exposed on the banks of Elsey Creek and the Roper River.

*July 13 (Sunday).*—Leaving the camp at 8.30, proceeded down the creek, but mistaking a tributary for the principal channel, followed it s. for 2 hours, when it divided into many small gullies, and we therefore returned to the main creek, and at 4.25 camped about 3 m. N.E. of our starting point in the morning.—(*Camp XVI.*) The country passed over was of a very poor character; stiff clay flats, with melaleuca scrub, occupied the valley, while low but steep ridges of sandstone rose to the E., and were timbered with stringybark, bloodwood, &c. To the s. the country seemed to rise slightly, but was very poor and sandy. The smoke of bush-fires was visible to the N. and S.E. Several trees near the camp had been cut with iron axes.

*July 14.*—Resuming our journey at 8.10, steered N.E. down the valley of the creek, which I named Elsey Creek, after the surgeon and naturalist of the expedition. Its course was average N.E., but spreading into lagoons and swampy flats, was very tortuous and irregular; then changing into a long winding reach of water, 50 to 60 yards wide, with low banks covered with reeds and tall melaleuca trees, beyond which was a belt of pandanus growing on the drier ground. Many small springs rose in the limestone and ran into the creek, on the banks of which were large heaps of mussels at the camps of the blacks. The banks of the creek and springs were so soft and boggy, that the horses could not approach the water to drink, and we followed the creek in vain search for a suitable spot till 4, when we camped and watered the horses with the leather buckets.—(*Camp XVII.*)

*July 15.*—Leaving our camp at 7.10, steered N.E. till 9 over a level country, which appeared to be very swampy in the rainy season. Altered the course to  $10^{\circ}$  mag. and crossed a shallow dry water-course, which proved to be the continuation of Elsey Creek. At 11 turned to  $60^{\circ}$  mag. and shortly came on the bank of a fine river, with banks 30 to 40 ft. high and reaches of water 50 to 80 yards wide.—(*Camp XVIII.*) At 11.45 camped at the junction of Elsey Creek with the river, which is, doubtless, the Roper of Leichhardt. The fan palm was frequent on the bank of Elsey Creek, where it attained a height of 60 to 80 ft., with a thicker stem, and producing a more palatable vegetable than the species growing on the Victoria River.

*July 16.*—At 7.5 A.M. recommenced our journey, following down the Roper River to the S.E. and N.E. About a mile below the camp the limestone rocks formed a bar over which the river ran, with a rapid current 10 yards wide and 2 ft. deep. The banks then became low and the country very level, the overflow of the



river forming shallow lagoons, in which the nelumbium, or gigantic water-lily, was first observed. A ridge of low sandstone hills came close to the left bank, and on the right a vast level plain, covered with high grass and reeds, extended 2 or 3 m. back. This plain is evidently inundated during the wet season, though the soil was now dry and deeply fissured by the solar heat. The river divided into several channels full of reeds, and each with a small stream of running water, the deep green of the vegetation along the course of the running water contrasting strongly with the dry and withered reeds and grass which prevailed elsewhere. Clumps of *Melaleuca leucodendron* grew at intervals, and in the distance appeared like low hills. At 2 camped at the extremity of a low basaltic ridge, which approached the river from the s.—(*Camp xix.*) A range of flat-topped hills extended to the n.e., about 8 m. distant; they appeared wooded and 200 to 300 ft. high. Bowman rode down a young emu, which supplied us with a meal of fresh meat.

*July 17.*—At 7 steered E.S.E., following the course of the river for about a mile, when, to avoid the high reeds, the course was altered to s.e. till 8.10, and then to 100° mag. till 9.25, when we camped on a small water-hole, there being abundance of fine green grass.—(*Camp xx.*) The river appears to turn to the northward and enter a range of hills which extend n. and s. a few miles to the E. of the camp. The country traversed this day is all well grassed and thinly wooded with terminalia, box, and silver-leaved ironbark. Trap rock was frequently observed, and the soil was a good red loam. The metallic barometer has a second time suddenly deviated from the aneroid barometer, and the form of the vacuum vessel has visibly altered, the construction being too slight to bear the jolting of the pack-horse, though one of the steadiest has been selected to carry the instruments, and they are always wrapped in blankets.

*July 18.*—As this was a suitable spot for resting the party, and grass abundant, I rode to the s.e. with Mr. H. Gregory to look for a route towards the head of the Wickham River. Our course was along a valley between the trap hills to the w. and the sandstone range to the E. At 8 m. reached a creek trending n.e. Its channel was dry and sandy; but after some search found a small pool of water in a side channel. *Casuarina* and flooded gum-trees grew on the banks of the creek, and there was some good grass on the flats, which were limited by steep sandstone hills, wooded with acacia of the same species as that seen on the lower part of Sturt Creek. After an hour's halt at the pool of water we returned to the camp.

*July 19.*—The horses having separated much during the night, it was 8 before they were collected and saddled. We then followed yesterday's route to the pool of water in the creek 8 m. s.e.

from the camp, reaching it at 11.45.—(*Camp XXI.*) The sandstones here show a decided dip to the w., varying from  $5^{\circ}$  to  $30^{\circ}$ ; the trap-rocks only extend about 5 m. from the previous camp. In the afternoon five natives were observed watching our camp, and on finding they were observed, came up to us, but could not be induced to speak a single word; they soon after retired. They had no spears, and were followed by a small dog. Their teeth were entire, and they were circumcised. At 8 the blacks were detected stealing into the camp, and when ordered to retire, only hid themselves in the grass. As it was absolutely necessary to dislodge them from their position, I caused a gun to be fired in the air, hoping that they would retreat; but they commenced to shiver their spears, and I then ordered a charge of shot to be discharged among them, which had the desired effect, and they retired with precipitation. What their object could be in approaching our camp at night, unless for a hostile purpose, we could not, of course, ascertain; but the aboriginal Australian considers it an act of positive hostility to approach the camp of a stranger in silence, especially at night.

*July 20.*—Starting at 7.30 A.M. steered s.e. over an undulating sandstone country, well grassed, but very stony and thinly wooded. A low range of hills, nearly parallel to our course, lay to the s.w., and at 11.30 we camped at a fine running spring, in a very rocky ravine in the range.—(*Camp XXII.*) The grass was very dry and inferior near the hills.

*July 21.*—The horses had shown an unusual desire to stray from the camp during the night, and as we had reason to expect a visit from the blacks, they were kept close to the camp. At 6.20 steered s.e., crossing a table-land about 250 ft. above the camp, and at 8 descended by a rocky ravine, in which was a fine spring, into a grassy valley, which varied from a few yards to a mile in breadth, bounded by sandstone hills, the strata of which were not well defined, but appeared to have a considerable dip to the w.s.w. In the upper part of the valley the creek was well supplied with water, but as we advanced the channel was dry, though increased to 20 yards in breadth and 10 to 15 ft. deep. At 11.15 one of the horses, "Prince," was observed to be unwell, and at 1.20 a second horse, "Bob," was also noticed to be suffering great pain. Having bled them we continued our route down the creek in search of water at which the party could halt, and found a small water-hole at 2.20; but the two sick horses dropped dead about 150 yards short of the water. Their loads had been previously removed to the saddle-horses.—(*Camp XXIII.*) As soon as the camp was established, Mr. Eisey and Dr. Mueller examined the dead horses to ascertain the cause of death, and it appeared from the state of excessive inflammation of the stomachs that they had eaten some

poisonous plant ; but the food had been too much comminuted to admit of any of the plants eaten being recognised.

*July 22.*—At 7-10 resumed our journey down the creek to the E. and E.N.E., passing a fine lagoon with nelumbium growing on the margin, and a large flock of pelicans floated on its surface. At 8-30 passed two large creeks and a second lagoon, 70 yards wide and 300 yards long. The principal creek now turned to the N., and our course was along the foot of a sandstone range, 200 ft. high, till 12-40, when altering the course to S.E., we ascended the range and crossed a level sandy table-land covered with scrub. Descending to the S. found a small dry water-course in an open valley, which we followed in search of water to the N.W. till 4, when we camped at a small pool of rain-water.—(*Camp XXIV.*)

*July 23.*—The horses had strayed so far in search of grass that we did not start till 10-30 A.M., when, steering S.E., we crossed a spur of the table-land which lay to the S.W. Passing several scrubby valleys, with small water-courses trending to the N.E., camped at a shallow water-hole at 3-20.—(*Camp XXV.*) The country was of sandstone formation and the soil very poor, melaleuca scrubs prevailing on the lower ground, and eucalypti, acacia, and Grevillia on the hills. To the S.W. the hills were rocky and with rounded outlines, but to the N.E. flat-topped and of less height. The sandstones often dip at a considerable angle, but in no general direction. A thin bed of ferruginous conglomerate rests on hard grey sandstone, imperfectly stratified, beneath which shales of various colours exist. On the exposed surface of these shales an efflorescence of sulphate of magnesia was frequent.

*July 24.*—Resuming our route at 7-50, steered S.E. and ascended a sandstone range with horizontal strata, and very abrupt on the S.E. side. Entering a wide valley crossed two watercourses, one of which was running apparently from springs, as several clumps of melaleuca leucodendron grew on the slopes of the sandstone hills, from which these water-courses came. Crossing a second spur of the table-land, descended to a small creek with small water-holes and narrow grassy flats, at which we encamped. The general character of the country was very poor and scrubby.—(*Camp XXVI.*)

*July 25.*—At 7-10 left the camp and steered S.E., through a succession of scrubs of eucalypti, Grevillia, acacia, Jacksonia, and Bossiwea, with occasional patches of melaleuca. At 1 crossed a steep ridge of sandstone rocks, and gradually descended till 2-55, when we encamped on a small gully coming from the S.E., and in which a little water remained, and on the banks a little dry inferior grass existed.—(*Camp XXVII.*) Since leaving the Roper River the general character of the country has been worthless, the small size of the water-courses indicating an arid country to the S.W. of

our route. Few traces of blacks have been observed, though vast columns of smoke rise to the E. and S.E. Animals or birds are rarely seen. The rocky nature of the country has caused the horses' shoes to wear out rapidly, and the day seldom passes without having to replace the shoes of several of the horses.

*July 26.*—At 8 steered S.E., soon entering a scrub of acacia, melaleuca, Grevillia, and a few eucalypti; the soil sandy, with a few blocks of grey sandstone. Some small dry water-courses trended to the N. At noon crossed a large creek trending to the S.S.E. through a very rocky valley; the whole country became very barren and rocky. At 2.35 recrossed the creek, which turned to the E. and N.E. After following it down for an hour found a small patch of grass and encamped; the bed of the creek was well supplied with water in shallow rocky pools.—(*Camp xxviii.*)

*July 27 (Sunday).*—Resumed our route at 7, crossing a very rugged ridge of hills, in descending one of which a horse wedged his foot into a cleft of the rock, and falling down, was only extricated by beating away the rock with an axe. Fortunately, though much bruised, there was no serious injury. With some difficulty we extricated ourselves from these rocky ridges, and, crossing a large creek, entered a level plain covered with melaleuca scrub. Crossed two sandy creeks 15 and 20 yards wide, with shallow pools of water. At noon passed a barren ridge of white sandstone hills, and entered an open grassy plain, with clumps of melaleuca trees indicating the existence of springs, at one of which we encamped at 1.25.—(*Camp xxix.*) The country traversed is of a worthless character; there is very little grass, and the soil poor and stony. The sandstones are of grey colour, not regularly stratified; but where it could be ascertained the bedding is horizontal and the laminæ dip  $20^{\circ}$  to  $30^{\circ}$  to the N., but often in the opposite direction. These sandstones are at least 200 ft. thick, and rest on soft shales of white, brown, and green colour.

*July 28.*—The indifferent character of the grass having caused the horses to stray in search of better feed, we were delayed till 8.30, when, steering S.E., we crossed several low ridges of sandstone, wooded with white and mica bark gum, and thorny triodia. In the hollow small dry watercourses trended to the N.E. and N. At 10.20 crossed a creek 10 yards wide, with pools of water, and at 1.5 a second of the same size, which, trending E., was followed till 1.50, when a small pool of water and a patch of grass enabled us to encamp.—(*Camp xxx.*) The country continues to be of a bad description and covered with scrub, though of a more open nature than before. The soil is more gravelly and melaleuca less frequent; eucalypti and triodia more abundant. The rock is a coarse grey sandstone, thick bedded, horizontal strata and laminæ dipping to the N.E.  $30^{\circ}$  generally, but varying much: the peculiar

marking of the surface, resembling ripples of water, is frequent, forming grooves 2 to 4 inches wide and half an inch deep.

*July 29.*—A dense fog was the somewhat unusual cause of delay in collecting the horses this morning, as they could not be seen more than a few yards distant. At 8:45 steered s.e. through scrubs of melaleuca, acacia, Grevillia, and eucalypti. At 11 the country was more open, and we entered a grassy plain extending 5 to 8 m. to the e., where it was bounded by low ranges of hills. To the s.w. a level forest of white gum trees extended parallel to our route. The soil was a brown clay loam, with pebbles of sandstone. A few box and Baubinia trees grew on the plain; the grass had been burnt off and had sprung up quite green. At 1:20 came on a large dry creek, trending n.e.: it had several channels 20 yards wide, with loose sandy beds bordered with casuarina and flooded gum-trees. Following down the creek at 1:15, camped at a shallow water-hole in one of the side channels.—(*Camp xxxi.*) About 3 m. before reaching the camp, Dr. Mueller's horse, "Monkey," knocked up, and was with difficulty brought to the camp. The load of one of the pack-horses was distributed among the others, in order to remount the Doctor, who required a very strong horse, although perhaps the lightest person in the party.

*July 30.*—There being abundance of good grass at this camp, we remained this day to rest the horses and shoe them; also to repair harness, &c. I was glad to get a day's rest myself, having been 40 days in the saddle without a single day's intermission. Eleven of the horses were reshod.

*July 31.*—Leaving the camp at 7:40, steered a s.e. course. Leaving the grassy flats of the creek, we soon entered a scrub of melaleuca. At 8:20 ascended the table-land by a gentle slope. The country was now sandy, with much brush of acacia, Grevillia, and Bossiwea, with triodia in the more open part of the forest, which consisted principally of micabark gum. The prevailing rock was ferruginous conglomerate, and hard sandstone sometimes appeared. After 10 the country declined to the s., and we passed through a belt of cypress scrub. At 1:15 altered the course to e.s.e., crossed a sandstone ridge, and came on a deep valley with sandstone cliffs on each side. With some difficulty descended and reached a small water-course, which was quite dry; but observing some very green trees about a mile to the n.w., at the base of the cliffs, we turned in that direction and found a fine spring of water flowing from the face of the cliff. Selecting a suitable spot, we encamped at 2:30.—(*Camp xxxii.*) Near this spring were several huts, constructed in the rudest manner by heaping branches together. From the summit of the hill the view extended 30 m. to the n.e.; but no marked features were visible, the country only undulating slightly. The country has become more open

and travelling easier; but no other improvement has been observed.

*August 1.*—At 7-30 left the camp and followed the valley to the s. till 9-15, when a break in the sandstone cliffs which bounded the valley enabled us to ascend the hills and pursue a s.e. course, crossing several ridges of sandstone, the strata dipping to the w. and becoming more shaly as we advanced. Descending into a valley, with a dry creek 15 yards wide, the rocks on the s.e. side were cherty limestone, alternating with thin beds of shale, the strata dipping  $20^{\circ}$  to  $30^{\circ}$  to the w. The summits of the hills had a thin horizontal bed of ironstone conglomerate, through which masses of white sandstone protruded. The limestone country was well grassed and thinly timbered with eucalypti of small growth. At 1-20 altered the course to n.e. and followed down a gully in search of water; but though it gradually enlarged to a considerable creek and we continued our search till 7, were compelled to encamp without water.—(*Camp xxxiii.*) I walked down the creek 2 m., but only found one moist spot, where, by digging, a few pints of water were procured, but not sufficient to supply ourselves.

*Aug. 2.*—At 6-5 resumed our search for water, following the creek n.e. for two hours, and reached a small pool of muddy rain-water, at which we encamped.—(*Camp xxxiv.*) The country near the creek was very level, grassy, and thinly wooded; low hills were visible to the s.e. and n.

*Aug. 3 (Sunday).*—The water in the pool being nearly consumed and nothing but mud remaining, we proceeded down the creek in search of a farther supply; but it was not till we had followed its dry sandy channel for three hours that we attained our object, and encamped at a small pool in one of the back channels, the principal bed of the creek being perfectly dry.—(*Camp xxxv.*) The country near the creek continues very level and well grassed, but distant rocky hills are visible in almost every direction. In approaching the Gulf of Carpentaria, heavy dews and fogs have become more frequent in the mornings, when it is usually calm. About 10 a.m. a breeze sets in from the eastward, varying from n. to s.e. At sunset it falls calm, but commences at 8 p.m. and blows gently from the eastward for one to two hours; very thin clouds are frequent, and the heat is very oppressive when they prevail. According to my reckoning, we are now within 50 m. of the sea-coast, and therefore much nearer to Dr. Leichhardt's track than I could wish; but however desirable a more inland route might be, it is evident, from the small size of the watercourses hitherto crossed, that we have been skirting the table-land which is, doubtless, a continuation of the desert into which we followed Sturt Creek; and the small altitude of the country in which the watercourses trending towards

the Gulf take their rise, precludes the existence of any considerable drainage towards the interior.

*Aug. 4.*—The general course of the creek being northerly, and the distance from the MacArthur, according to the map, only 20 m., we steered S.E. from 6.35 A.M., crossing many rocky sandstone ridges and hills, the strata dipping  $20^{\circ}$  to  $40^{\circ}$  to the W. At noon, from one of the higher ridges, saw the valley of the MacArthur to the S.E. Continuing our route, descended a small dry watercourse till 4, when we reached a large creek, with a belt of casuarina, melaleuca, and eucalypti along its banks; the channel was dry and sandy, about 20 yards wide, but showed the marks of high floods. Following the creek down for three quarters of an hour, found a small pool of water just sufficient for the supply of the party.—(*Camp xxxvi.*) A quarter of a mile below the camp a creek, 15 yards wide, joined the principal creek from the S., and, from the general lay of the country, it was evident that we had reached the principal channel of the MacArthur River of Leichhardt; but though from the steepness of the banks the floods frequently rise 30 to 40 ft., the creek did not bear the character of one taking its rise any great distance inland of our track. The country traversed is very thinly wooded with small eucalypti, seldom more than 50 ft. high, and a few leguminous ironbark and sterculia were scattered on the hills, with much triodia and little grass. After crossing the highest ridge at 11, the sandstone strata were variously inclined, but generally to the W. or N.E. at high angles, except on the immediate bank of the MacArthur, where the sandstones were horizontal. To the S.W. of our route the country rose into stony hills of very barren aspect; to the N. the country was wooded.

*Aug. 5.*—The country to the S.E. being very rocky and broken, we followed down the river, leaving the camp at 7.20, the general course N.E.; the sandstone hills rose abruptly from the bank of the river, so as to leave scarcely a passage for our horses. The rock was frequently worn away in a partial manner, leaving vertical columns sometimes 5 ft. diameter and 30 ft. high. A few miles below our camp we passed some pools of water, but there was no grass near them, and we continued our route 4 hours, and camped near some shallow pools with a patch of grass on the bank of the river.—(*Camp xxxvii.*) The river has several channels separated by banks covered with trees, the principal one 23 yards wide at the camp, but in time of flood the side channels carry off the greater portion of the water, which rises at times nearly 40 ft. Large quantities of mussel shells lay at the old camping places of the blacks along the banks of the river.

*Aug. 6.*—At 7.25 resumed our journey on a S.E. course over a miserable sandy country with stunted eucalypti, Grevillia, and

triodia. At 11 reached a very rugged range of sandstone hills, which, with much difficulty and risk to the horses, was crossed in an E.S.E. direction; but though the distance did not exceed 3 $\frac{1}{2}$ m. the deep ravines and steep rocks delayed us for 3 hours, and we were glad to emerge into an open valley, in which we encamped on the bank of a small gully with a few small water holes at 2.30.—(*Camp xxxviii.*) In the deep ravines of the sandstone hills water was abundant, but quite inaccessible for the horses from the steep and rocky nature of the banks of the watercourses. A few small white gum trees and triodia formed the principal vegetation. The rock is a grey sandstone with horizontal beds, the laminae varying so much both in angle and direction, that no general average could be ascertained; that of the upper bed being often the reverse of that immediately below it. The beds of rock vary from 1 to 4 ft. in thickness, and the laminae  $\frac{1}{2}$  to 2 inches. The grain of the rock very even and moderately fine.

*Aug. 7.*—Resumed our journey at 7.10 A.M., on an average E.S.E. course along the foot of a rocky range of hills. At 8.30 came on a deep rocky creek with long pools of water trending to the N. As our horses required rest, and the country ahead appeared very rocky and barren, we encamped.—(*Camp xxxix.*)

*Aug. 8.*—Steering a S.E. course from 6.50 A.M., crossed a sandy table-land with mica-bark gum, and melaleuca with broad leaves: passed a small creek with pools of water, the trend N.E. At 10 crossed a low ridge of rocks and descended into a wide valley with melaleuca and a few box trees; and at 1.25 camped on a large sandy creek with two channels 10 yards wide and low sandy banks.—(*Camp xli.*) One of the channels was dry, but the other had a few small pools of water in it. A line of melaleuca and flooded gum trees marked the course of the creek through the valley; when in flood the water extends to 100 yards in breadth and 10 to 15 ft. deep. The grass was inferior, but having been burnt off, was now fresh and green.

*Aug. 9.*—Starting at 6.40 A.M., traversed an undulating sandstone country on a S.E. course till 1.15, when we came to a large dry creek; followed it to the N.N.E. till 1.50, when we found a shallow pool at which we encamped.—(*Camp xli.*) The creek had a sandy channel with low banks, subject to flood to the breadth of 50 to 80 yards. Pandanus, melaleuca, and flooded gum trees grew on its banks. The country generally is poor and stony, with mica-bark gum, bloodwood, and narrow-leaved melaleuca. Shortly before reaching the creek the horse Monkey knocked up, though only carrying a pack-saddle without any load since the 30th July: I therefore left the saddle after removing such portions of the fittings as might be of future service. A few yards from our tents we found some spears and water vessels



which had been hidden under a piece of bark by the blacks, who were evidently out hunting, and we heard them calling to each other in the evening, though they did not make their appearance. The water vessels were formed by hollowing out a block of wood in the form of a canoe, and were capable of holding 2 to 3 gallons. It was evident that they have cutting instruments of iron and also of stone.

*Aug. 10, Sunday.*—As there was a sufficient supply of water and grass, we remained at the camp to rest the party. The morning was cloudy, but cleared up about 9 A.M., and I observed a set of lunar distances. Dean brought in some jasper from a hill 1 m. to the N.E. of the camp; he reported that the course of the creek appeared to be about N. for 8 or 10 m.

*Aug. 11.*—Continued a S.E. route at 7.40, ascending hills of limestone and sandstone, with an upper bed of basalt, which on the higher land to the S.W. was again covered by sandstone. The basalt was much decomposed, and contained fragments of the lower rocks. At 1.50 camped on a fine but small creek, with permanent pools of water, in a rocky channel 5 to 30 yards wide.—(*Camp XLII.*) The country was well grassed and openly wooded with box, *stereulia*, leguminous ironbark, and *terminalia*.

*Aug. 12.*—At 6.50 resumed a S.E. route, traversing a broken country of limestone, chert, sandstone, and basalt, deeply cut by dry watercourses. The grass was abundant and good, though *triodia* appeared on some of the higher ridges. At 9 crossed a small river with fine permanent pools of water in a rocky bed 10 to 30 yards wide. The floods rise 20 ft. and extend over a breadth of 70 to 100 yards; it is the largest stream bed passed since leaving the Roper River, and probably extends 50 or 60 m. farther inland. At 1.25 camped on a small creek trending to the N.N.E., in which were pools of water 20 yards long and 5 ft. deep.—(*Camp XLIII.*)

*Aug. 13.*—Left the camp at 7 A.M. and continued a S.E. route, crossing a succession of sandy valleys and broken sandstone ridges, the strata horizontal, and laminae dipping to the N. and E. generally, but sometimes opposite. The soil poor and sandy, producing little besides white gum and *triodia*. At noon ascended a high ridge from which we saw a broad valley to the S.E., beyond which was a range of flat-topped hills, terminating abruptly at the northern end, which bore E. by N. Descending by a rocky ravine at 1.30 reached a fine creek on which we encamped.—(*Camp XLIV.*) This creek had pools of water 50 yards wide, but the steep character of its banks caused the channel to appear larger than if it had been in flat country. Under some large rocks Dean found a fishing net neatly made of twisted bark, the mesh  $1\frac{1}{2}$  inch, the length about 30 feet. Some fishing spears showed the marks

of iron tools having been used in their construction. The rocks in this part of the country often contain angular fragments of the lower strata, the limestones containing fragments of chert and jasper, and the sandstones pieces of limestone, but I could not detect either granite, quartz, or slate.

*Aug. 14.*—At 6·20 we were again in the saddle, and steering s.e. over very rocky hills till 8, when we entered a fine valley with low hills of limestone and basalt, well grassed and thinly wooded with box and acacia. At 10 ascended a rough sandstone range with white gum, acacia, and triodia. At 11 again descended into a valley bounded by sandstone cliffs on the northern side, and camped at a fine pool of water in a small creek at 12·5.—(*Camp XLV.*) Several trees near this pool of water had been marked by the natives, the bark having been removed and the wood painted yellow with brown spots at regular intervals, and vertical black-waved lines. It is evident from the outlines of the hills and general character of the country that we are travelling along the edge of the table-land of Northern Australia, and this accounts for the small size of the watercourses, while the abrupt and broken nature of the hills has caused the creek to form channels of sufficient size to retain water throughout the year, and the same disruption of strata has exposed the limestones and basalt, causing fertile patches of country, which have enabled us to traverse a country that is otherwise barren and inhospitable in the extreme—the chief difficulty to be surmounted being the rocky nature of the hills and ridges, which can only be traversed by well-shod horses. It is possible that some small tracts of available country exist between our line of route and the shores of the Gulf of Carpentaria, but to the s. little can be expected but a barren sandy desert, as on every occasion that the table-land has been ascended nothing but worthless sandy country has been encountered.

*Aug. 15.*—Recommended our journey at 6·35, and followed the valley of a creek upwards to the s.e., and at 7·45 crossed the creek below a fine pool of water, above which the creek came from the s.w., in which direction low barren sandstone hills existed. We then crossed several miles of level sandy table-land, and descended at 10·20 into a deep valley trending e. This brought us to a small creek with good water holes, where we camped at 11·30.—(*Camp XLVI.*) The country is very poor and rocky, thinly timbered with box trees in the valleys, and white gum on the hills, where the grass is replaced by triodia. Kangaroo are more numerous than in any other part of Northern Australia yet visited by the Expedition, as many as 12 to 15 being seen in the course of a day's journey. Early in the morning a light breeze from w.; at 7 A.M. a fresh breeze from s.e., which lasted till 4 P.M.; and at sunset a light air from the w.

*Aug. 16.*—At 6:30 steered s.e. and followed the valley of the creek till 8, when it turned to the n. Continuing our course along the valley s.e., though there was now no watercourse in it, at 11:20 came to a creek in a basaltic valley trending n.e. across the larger valley, then crossing a ridge of sandstone and basalt came on a second creek trending n., in which were long pools of water 15 to 20 yards wide. Following this creek upwards to the s.s.e. the valley widened, but for some distance the pools of water ceased. At 12:40 camped at a pool supplied by a spring, and a patch of good grass adjacent.—(*Camp XLVII.*) The rock which formed the hills on this day's journey is a hard red-brown sandstone, the lower part thin bedded: beneath this trap or basalt has been forced between the strata, and is exposed in the deep valleys excavated by the creeks. The view to the n.e. from some of the higher ridges extended 20 m. over a level, depressed country, apparently wooded, beyond which were low ridges of hills. The country generally is poor and stony, thinly wooded with eucalypti and acacia, except where the basalt was exposed, and by its decomposition formed a richer soil well covered with grass, and very open in character.

*Aug. 17, Sunday.*—Grass and water being in sufficient quantity, remained at the camp to rest the horses, though, as several of the horses had to be shod, it was not altogether a day of rest to ourselves. A fresh breeze from s.e. cooled the air at noon, but died away at sunset.

*Aug. 18.*—Collected the horses early, but two appeared to be much griped from eating the coarse food, and I therefore delayed starting till 7:40, and then ascended the stony ridge to the s.e., and reached the table-land; the soil was sandy, with micabark gum, stringy bark, and bloodwood, with patches of acacia scrub. At 10 the country was stony, with white gum acacia, with tall stems, and triodia. Gradually ascending till the aneroid indicated an elevation of 1100 ft., we appeared to be on a ridge parallel to the boundary of the table-land of the interior, and at a greater elevation. At 1:20 observed a clump of melaleuca leucodendron in a deep ravine, and steering towards it found a fine spring, with a few acres of grass, where we encamped.—(*Camp XLVIII.*)

*Aug. 19.*—At 6:45 steered s.e. and soon ascended a rocky range of altered sandstone and basalt thinly wooded with white gum, tall acacia, and Grevillia; triodia superseding the grass. At 7:30 the aneroid indicated the greatest altitude (1300 ft.) which we had attained since leaving the Victoria River. From this point the view was extensive. Towards the interior the table-land, not being of equal elevation, appeared like a vast plain without a single marked feature. To the n. the country appeared to consist of low wooded ridges gradually decreasing in height as they

receded; s.e. our view was intercepted by broken wooded hills of equal height with our position, while deep ravines trending to the s. intercepted our route. I therefore altered the course to  $200^{\circ}$  magnetic, and descended a rocky valley in which was a small creek, which rapidly enlarged as we proceeded, and contained some fine pools of water in rocky hollows. The hills consisted of basalt and altered sandstone, the strata dipping  $20^{\circ}$  to  $60^{\circ}$  to the n.w., and by the outcrop forming parallel ridges, which were passed with great difficulty and risk. At 12.30 we extricated ourselves from these rugged ridges and entered a level valley extending 30 m. n.e. and s.w. Here granite rock was first seen on the bank of the creek, which trended across the valley to the s.e., with a broad sandy bed or series of channels extending over a breadth of  $\frac{1}{2}$  a m., quite dry and overgrown with bushes. At 4.5 reached the hills which bounded the valley to the s.e., and the creek, entering a deep gorge, which, by concentrating its waters, formed a fine pool of water, at which we encamped.—(*Camp XLIX.*) The country, after leaving the basaltic hills where it was well grassed, was barren and worthless sand and rock.

*Aug. 20.*—We left our camp at 7 A.M., and finding the valley of the creek impassable, crossed the rocky hills in an e.s.e. direction, the country consisting of steep rocky ridges of sandstone covered with triodia, and a few stunted eucalypti. At 3 we again came on the bank of the creek, and camped in a patch of coarse rushes, as there was no grass for the horses.—(*Camp L.*)

*Aug. 21.*—Leaving this miserable spot with our starving horses followed down the creek, which had now increased to a small river to the e.s.e., and after 2 hour's travelling reached a small patch of grass, at which we encamped.—(*Camp LI.*) The bed of the river is nearly dry, only a few shallow pools of water remaining in the sandy channel, which varies from 10 to 50 yards in breadth, with several smaller side channels, altogether occupying a breadth of nearly 400 yards, dense clumps of *melaleuca leucodendron* growing on the intervening banks of sand. Large quantities of mica shells, some 6 inches in length, were found on the banks of the river, in the camps of the natives. Bowman complains of an attack of scurvy, which causes pains in his legs and swelling of the gums.

*Aug. 22.*—Although our yesterday's journey was only of 2 hours' duration, the horses appeared very weak and fatigued when we started at 6.45 A.M., and it was with great difficulty that "Boco" and "Monkey" could be kept up with the party. We were frequently compelled to leave the bank of the river and cross steep rocky ridges of sandstone which came close to the river's bank. The country was very rugged and barren, producing little

besides triodia and a few stunted gum trees. The bed of the river has increased to 400 yards in breadth, but is full of sandy banks covered with large melaleuca and acacia trees. At 1.5 camped in a small patch of dry wiry grass, procuring water from a small pool in the sandy bed of the river.—(*Camp LIII.*)

*Aug. 23.*—Resuming our journey at 7.15 A.M., followed the right bank of the river to the E.N.E.; it soon passed between two sandstone hills and turned to the N. Continuing our course, a range of rocky hills compelled us to alter our route to N.N.E. to regain the bank of the river, and by following an ana branch till 11, when it joined the principal channel, avoided the rocky country. The river now trended N.E., and at 11.30 camped in a small grassy flat.—(*Camp LIV.*) The valley of the river is now more open, but the country is very barren, with stunted eucalypti and triodia on the hills, and melaleuca and flooded gum trees, with a little grass, on the bank of the river. The hills have decreased in height; the upper strata thick bedded coarse sandstone, with shaly sandstone beneath. Hard white sandstone exists on some of the lower ridges.

*Aug. 24, Sunday.*—Although this was not a good spot for a day's halt, yet it was requisite that the horses should have a day's rest, and as it was Sunday we remained at the camp. While collecting the horses a native woman and a child were seen in the bed of the river, but on being approached concealed themselves in the reeds: though the blacks set the grass on fire in several places, during the day they were not seen.

*Aug. 25.*—Resumed our journey down the river at 8.5 A.M., the general course nearly E. At 2.35 camped at a pool in one of the side channels of the river.—(*Camp LIV.*) The country was now more open and level, with grassy flats along the river; but the back country rose into low rocky sandstone hills, thinly clothed with white gum and triodia. At noon crossed a high ridge, from which, though the view was extensive, nothing was visible except a range of hills 15 m. N. of our position, and which terminated abruptly on a N.E. bearing; the rest of the country consisted of low wooded ridges. The bed of the river is about  $\frac{1}{4}$  mile wide, consisting of several broad sandy channels, with low sandy banks between, covered with melaleuca and acacia trees. Some of the party walked down the bed of the river and came on the camp of a party of blacks, but only one lame old man remained, who attempted to frighten away the invaders of his country by loud yells and exclamations of disgust.

*Aug. 26.*—Followed down the river from 6.45 till 1.40, the general course nearly E.—(*Camp LV.*) The country becomes more level as we advance, and ironstone conglomerate forms low banks to the bed of the river, which is unchanged, being dry

sandy channels. The back country shows no improvement, and is covered with triodia to the exclusion of grass. Some blacks were seen on the left bank of the river, but though within hearing of the horse-bells, did not appear to notice us.

*Aug. 27.*—The course of the river continues easterly, and we followed the right bank from 7.30 A.M. till 1.5 P.M., when we camped at a fine pool of water in one of the side channels, the principal one being dry and sandy.—(*Camp LVI.*) The immediate banks of the river are openly timbered with box, flooded gum, leguminous iron-bark, and nelia. The grass is rather scanty, and the soil brown loam. Beyond the influence of the floods the country was level, and broad-leaved melaleuca, chuncoa, silver-leaved iron-bark, and dry triodia, formed the entire vegetation of this worthless plain. Ferruginous conglomerate and sandstone boulders are the only rock visible.

*Aug. 28.*—Our day's journey commenced at 7, and following the river's right bank to the E.N.E. till 12.45, encamped in the bed of the river, which was nearly  $\frac{1}{2}$  a m. wide from bank to bank, the principal channel 80 yards wide, shallow, and sandy, with small pools of water; the side channels similar, but dry, and of less width.—(*Camp LVII.*) Beyond the bed of the river the banks rose abruptly about 30 ft., and then appeared to decline as it receded, and no higher ground was visible. The soil was a sandy loam, with small box trees and scanty grass.

*Aug. 29.*—At 7.20 A.M. steered E. through level box flats, the country gradually becoming more open and better grassed, though still very scantily. At noon crossed some open grassy plains, and altered the course to N.E., N.N.E., and N. At 3.20 again came on the river, and camped at a small pool; the rest of the channel, which exceeded  $\frac{1}{4}$  m. in width, was dry, sandy, and overgrown with large melaleuca and flooded gum trees.—(*Camp LVIII.*) The general character of the country is a level plain about 40 ft. above the channel of the river, thinly wooded with box, a few bloodwood, acacia, and Bauhinia trees. The grass, though scanty, is of good description, but at this season very dry.

*Aug. 30.*—At 6.50 steered E.N.E. through box flats and open grassy plains, the course of the river nearly parallel to our route. At 10.10 came to a large tributary from the s.; its principal channel was 30 yards wide, with pools separated by dry banks, but two smaller channels had running streams. After  $\frac{1}{2}$  an hour's delay we succeeded in crossing without more serious accidents than resulted from some of the pack-horses falling down the banks and wetting their loads, and getting a ducking myself, which injured the chronometer. Water pandanus, fan palm, and casuarina formed a belt of trees along the bank of the stream, which bore quite a different character from that of the river above its junc-

tion. Continuing our route, at 12·5 came on a second running creek, but of smaller size : this we crossed, and followed the right bank E. till 1·5, when we encamped.—(*Camp LXIX.*) Here we observed that though the water was fresh, it was affected by the tide, which was now at the highest springs.

*Aug. 31, Sunday.*—Rode down the creek with Mr. H. Gregory. At 2 m. from the camp came to a similar creek joining it from the s. ; the two forming a fine reach of water, which we recognised as the Albert River of Captain Stokes. This spot between the two creeks was the rendezvous appointed for the two sections of the Expedition, though, from the short time which had elapsed since leaving the Victoria, the *Tom Tough* could scarcely be expected to have arrived before us. On approaching the spot we saw several marked trees, but were disappointed in the hope that the schooner had reached the Albert, as the marks appeared to be the names of several seamen who seemed to have formed the crew of a boat sent up the river by Lieut. Chimmo of H. M.'s steamer *Torch*. Search was made for directions for finding any memoranda which might have been concealed, as I at first thought it probable that the object of the visit might be to communicate with us ; but the nature of the inscriptions, and the absence of anything which would lead to even a surmise of the cause of the visit, caused us to come to the conclusion that it had no reference to the Expedition. From the state of the ashes of the fire, and the branches which had been cut and broken, it appeared that several weeks had elapsed, and consequently that the *Torch* was not likely to be still in or near the river. In accordance with arrangements made with Mr. Baines I marked a tree, in order to apprise him of our having arrived at the Albert, and of our prospective movements. Returning to the camp, wrote a memorandum of the visit of the Expedition, and a note to Mr. Baines, informing him that we intended leaving other memoranda at the junction of the salt-water arm of the river, and then continue without delay our route towards Moreton Bay. These memoranda were enclosed in a powder canister, and Mr. Elsey and Bowman took them to the marked tree and buried them in a hole I had dug for that purpose, 1 yard E. of the tree. In the afternoon I rode over towards the Nicholson River with Mr. H. Gregory. Crossing Beames Brook steered N.N.E.  $4\frac{1}{2}$  m., over level grassy plains, with strips of box trees. As we could see 4 or 5 m. farther, and no indication of the river, we returned to the camp, having ascertained that the Nicholson River does not join the Albert, unless many miles below the junction of Beames Brook and the s. creek, which together form the Albert River.

N. A. E.
AUG. 30,
1856.
DIG. 1 Y <sup>d</sup> .
To. E.

*Sept. 1.*—At 7·40 steered E. to the s. creek, which reached at

2 m., and followed it up for an hour in search of a crossing place, as the channel was very muddy. A suitable spot having been found, we filled up the channel with pandanus stems and crossed the horses without accident. Steering 2 m. E.N.E. over a level grassy plain, with patches of box trees, we then turned N. and struck the Albert River just at the junction of Beames Brook and the muddy creek, and encamped  $\frac{1}{4}$  m. lower down, as the water was brackish.—(*Camp LX.*) The existence of a narrow belt of mangrove shows that the water is often salt to the head of the Albert River.

Sept. 2.—The water in the river being very brackish, it was evident that no water fit for use could be procured lower down if we attempted to follow it towards the sea; I therefore decided on leaving the letters I had written to Mr. Baines at this spot, and accordingly marked a tree and buried the letters in a tin canister, stating that the exploring party was to start the following morning for Moreton Bay, and instructing Mr. Baines to remain at the Albert till the 29th September, 1856, in case any unforeseen accident should

N. A. EXPD <sup>r</sup> 30 AUGUST, 1856. DIG. 2 Y <sup>o</sup> N
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compel the party to return to the Albert within that period. Five months' flour, sugar, tea, &c. still remained; and as our horses would supply the deficiency of meat, if required, we have a sufficient supply of provisions to enable the party to reach the settled part of New South Wales, unless extraordinary difficulties should be encountered. Under these circumstances it did not appear prudent to delay at the Albert River, as the arrival of the *Tom Tough* might be delayed for an indefinite period.

Sept. 3.—Left our camp at 6.45 A.M. and steered E. over level box flats and open grassy plains; at 10 came to a small creek, which was followed  $\frac{1}{2}$  an hour to the N.E., when finding salt mud in its channel, we steered S.E. till 5, and encamped at a shallow pool in a large creek which trended N.—(*Camp LXI.*) The country consists of vast open level plains, separated by narrow belts of box and chuncoa trees, the soil a brown loam, producing rather short and dry grass. On approaching the water hole at which we encamped, a black and three or four women, who were camped on the other bank, climbed into the trees and remained there till dusk, when they descended to their fires and made a great noise till 9 P.M., when they departed. This creek is probably the head of the salt-water arm of the Albert or the Disaster River.

Sept. 4.—Continued a S.E. course through large open plains thinly grassed; passed a dry watercourse with a small pool of water in one of the side channels, but the quantity insufficient for our horses. At noon camped at a shallow waterhole in a grassy flat. (*Camp LXII.*) Mr. Elsey walked  $\frac{1}{2}$  m. to the E., and came



to a river 80 yards wide, but, observing some blacks, returned to the camp. In the evening nine blacks came towards us, and appeared inclined to hostilities, but, after a short interview, retired up the river. These blacks were not circumcised, and their teeth were perfect; they had neither ornaments nor clothing of any kind, and only slightly seared on the back and chest. Their spears are large and heavy, made of a single piece of hard wood; they are thrown by the hand, and not with the throwing-board. The small spears for fishing were formed of reed, with a wooden point, in the usual manner, and used with the throwing-board, which is here flattened vertically. Clubs  $2\frac{1}{2}$  ft. long and  $2\frac{1}{2}$  inches diameter throughout their length, and shields formed of a single piece of wood  $2\frac{1}{2}$  ft. long and 8 inches wide. The river proved to be fresh, in detached pools, separated by rocky bars. It is evidently the river taken by Dr. Leichhardt for the Albert river, a mistake which has caused much error in the map of his route. As it was unnamed, I called it the "Leichhardt." The character of the country is inferior, as the grass which covers the plains is principally *aristidia* and *andropogon*; *anthisteria* exists only in small patches. The soil is a fine brown loam.

*Sept. 5.*—At daybreak heard the blacks calling to each other up the river, and while the horses were being brought in 19 blacks came to the camp, all armed with clubs and spears. They did not make any decided demonstration of hostility, as the approach of the horses appeared to keep them in check, but a person unacquainted with their treacherous character might have thought them friendly. When we started at 6.50 they followed the party to the bank of the river, and began to poise their spears, and, while we were crossing a deep ravine, made a rush forward, hoping to take advantage of our position, but, just as the leader was in the act of throwing his spear, he received a charge of small shot, which diverted his weapon, and seeing him retreat in some degree checked the remainder. We then charged them on horseback, and a few shot from our revolvers put them to flight except one man, who climbed a tree, where he was left. As our object was only to secure our safety, we did not follow up our advantage by pursuing the fugitives. Proceeding down the river a short distance, at 7.40 crossed to the right bank on a ledge of flat rocks. It was here about 100 yards wide, with shallow pools of water, the banks rising steeply 30 to 40 ft. Very little vegetation grew on the margin of the river, which appeared to be the result of salt water being occasionally forced up thus far during high tides. We now steered E. over level grassy plains, with patches of box and chuncoa, passing a small but deep waterhole, near which we saw two black gins. They did not appear to notice us. At 10.10 entered an open scrub of chuncoa, and

triodia replaced the grass. At noon passed a small waterhole, which the horses completely emptied. Altering the course to N.E., the country was covered with melaleuca scrub, with silver-leaved ironbark, triodia, and a little grass, but we soon re-entered the open plains which extended to the N., and following down a small watercourse, at 3.5 camped at a small muddy waterhole (*Camp LXIII.*) on the banks of which the blacks had often encamped, as shown by the heaps of mussel-shells round their fire-places. Our route has been along the southern limit of the open grassy plains, and to the S. the country rises into low ridges and stony plains covered with scrub and triodia.

*Sept. 6.*—Starting at 6.25 our route was average E. over a level country of very bad quality, the soil ironstone gravel producing chuncoa, triodia, and cochlospermum (silk cotton). Towards the latter part of the journey the country became more open and grassy. At 12.15 camped on a large creek, but only a few shallow pools of muddy water remained in the channel. (*Camp LXIV.*)

*Sept. 7, Sunday.*—Remained at the camp to rest the party. A strong S.E. breeze blew all night, the day clear and cool, and the air very dry. Repaired the saddlebags, which from frequent contact with rocks and dead trees were much dilapidated.

*Sept. 8.*—Steered E.S.E. from 6.40 till 11.40, crossing low ironstone ridges and wide grassy plains with belts of box, chuncoa, white gum, and silver leaved ironbark of small size, the grass very inferior, and patches of triodia on the ridges. We then traversed a level country covered with small trees and dry grass for 2 hours; then followed a dry watercourse to the N.N.W. for 1 hour: the shells of large unios were abundant in the dry hollows, but no water remained. Altered the course to E. and passed two lines of boxtrees which crossed the plain from S. to N., and at 5.50 camped in the plain without water: fortunately a strong breeze had rendered the day cooler than usual. (*Camp LXV.*)

*Sept. 9.*—Left our waterless camp at 6.10 and steered N. 50° E. over a level grassy plain, and at 9.40 reached a fine river of fresh water 100 yds. wide, but very shallow; pelicans, ducks, and other waterfowl were very numerous, but extremely wild. Having found a spot where the horses could approach the water in safety, we encamped, though the grass was dry and scanty on the immediate bank of the river, the surface of the soil having been much furrowed and washed by the rain. (*Camp LXVI.*) Small fragments of limestone and a few pebbles of quartz have been observed on the surface of the plain for the past 20 m., and a dark limestone rock is exposed on the bed of the river, where it has horizontal strata. Small pieces of flinty trap or slate exist in the gravel of the river. From its position this river must be the Flinders River of the charts.

Sept. 10.—6.40 again found us in the saddle, and crossing to the right bank of the river followed it to the s.s.e. till 7.20, when it turned to the s.s.w. Changing the course to e. we passed through a fine grassy plain for 2 m. and entered an open box flat well grassed, the soil a brown loam; this continued till 12.30, when we entered a belt of chuncoa scrub, and at 1 reached a small watercourse and camped at a fine water hole 50 yds. wide and 100 yds. long, with open grassy banks: the water appeared deep and permanent. (*Camp LXVII.*) This water hole would render a great extent of the fine grassy land around available for pasturage. In passing through the box forest we observed several sleeping places which had been constructed by the blacks during the wet season. They consisted of 4 stakes 2 ft. high, supporting a frame of small sticks 5 ft. long and  $2\frac{1}{2}$  to 3 ft. wide: from 3 to 20 were often grouped together.

Sept. 11.—At 6.20 steered e. for 1 hour through level box and terminalia flats with good grass and brown loam; came to a lagoon 80 yds. wide and nearly 1 m. long; beyond this was a creek with small pools of water; as it appeared to come from the s.e. we steered in that direction, but soon receded from it, as it turned to the s.s.e. Altering the course to the southward, at noon came to the creek, much reduced in size, melaleuca scrub and triodia growing close to its banks, only a few shallow pools of water remaining. At 12.25 camped at a small pool. (*Camp LXVIII.*) On the banks of the lagoon passed in the morning, large heaps of mussel shells showed the spots where, from the immense collection of them, the blacks had camped for centuries successively on the same spots, and a well beaten footpath along the bank showed it to be a favourite resort of the aborigines. Very few birds and no kangaroo have been seen since leaving the Albert River. The common flies are very troublesome from their immense numbers.

Sept. 12.—The course of the creek being from the s. and water very scarce in it, it does not appear that we have yet reached the streams rising in the high land at the head of the Burdekin and Lynd Rivers. It therefore seems desirable to steer an e.n.e. course till some stream-bed of sufficient size to retain water at this season be found, and then to follow it up to the ranges, where only water can be expected to exist to enable us to steer to the s.e. At an earlier season of the year, when water is more abundant, it would be desirable to ascend the Flinders River, and cross from its upper branches to the head of the Clarke; but under present circumstances this course would be highly imprudent, and no experimental deviations from a direct course justifiable. The grass being scanty, the horses had scattered much, and we did not leave the camp till 10.20, when we steered e.n.e. About a mile from the camp passed four blacks at a pool of water: they did not

observe us till we had passed, though only 100 yds. distant and the country very open. Our route was through level country wooded with box, bloodwood, terminalia, Grevillia, and broad leaved melaleuca, patches of triodia and a little grass. The soil a hard ironstone gravel and clay. Passing several dry shallow lagoons, came to a small dry watercourse, which we followed to the E., and at 2.10 camped at a pool of water scarcely 4 inches deep. (*Camp LXIX.*) Near the camp were some fine grassy flats, but they were limited in extent and the grass was very dry. The cool S.E. breeze has ceased, and the N. and N.E. wind is very light and warm.

*Sept. 13.*—At 8.5 A.M. steered E.N.E. through box flats with broad leaved melaleuca and a little grass. The country gradually became more scrubby, with Grevillia, terminalia, bloodwood, and triodia; the soil very poor, and in some parts sand and gravel. At 2 altered the course to N., and at 5.50 came to a dry creek in a rocky channel trending W., which we followed down till 6.15 and camped without water. (*Camp LXX.*)

*Sept. 14, Sunday.*—At 5.50 proceeded down the creek, on a nearly W. course, searching in the windings of the channel for water, but without success till 10, when we found a pool of good water, 50 yds. long and 2 ft. deep, at which we encamped. Some blacks had recently been at this place, and their fires were still burning. The country on the creek is very poor, with patches of open melaleuca scrub, box, bloodwood, leguminous ironbark, terminalia, white gum, and a few pandanus, triodia and a little grass. The soil sandy loam and ironstone gravel. The native bees appear to be very numerous, and great numbers of trees have been cut by the blacks to procure the honey.

*Sept. 15.*—At 8.15 resumed our journey N. 10° E. m. over a level country thinly wooded with box, bloodwood, melaleuca, terminalia, Grevillia, and cotton trees, also a small tree which we recognised as Leichhardt's "little breadtree," the fruit of which when ripe is mealy and subacid: some of the party who eat this fruit suffered from sickness afterwards. Several dry watercourses trending W. were crossed, and at 2.5 we camped at a small water hole in a sandy creek 15 yds. wide. (*Camp LXXI.*) By enlarging the hole we obtained, though with difficulty, a sufficient supply of water for the horses. On the flats near the creek the grass was good, but very dry.

*Sept. 16.*—Although our horses required a day's rest, none of our camps for several days past have afforded a sufficient supply of water and grass for a second night. Continuing a N. 20° E. m. course from 6.25 till 7.30, when we came to a dry creek, which we followed E. 1½ hours, when it decreased to a small gully; again steering N.N.E. passing over a level country, very poor, and with

patches of melaleuca scrub. At 2 came to a sandy creek which we followed to the w. till 6.5 without finding any water, and camped in an open box flat. (*Camp LXXII.*) I then walked down the creek, and was fortunate in finding a pool of water half a mile from the camp, and as soon as the moon rose we drove the horses to the water and filled our water-bags. Few parts of our journey have been through country so destitute of animal life as the level plains we have traversed since leaving the Flinders River. No kangaroo, or even their tracks, emu tracks very rarely seen, and very few birds of any kind even at the water holes. Many of the sleeping frames of the blacks have been observed, and thousands of deep impressions of their feet in the now dry and sun-baked clay show that during the rainy season the extremely level nature of the country causes it to be extensively inundated.

*Sept. 17.*—The supply of water and grass being sufficient, we remained at this camp to refresh the horses, as they had suffered much from the long stages.

*Sept. 18.*—Starting at 7, steered N.  $10^{\circ}$  E. m. till 12.30, crossing an almost level country with frequent hollows which form lagoons in the wet season; we then reached a sandy creek, in the bed of which we searched in vain for water, but found a fine lagoon about  $\frac{1}{4}$  m. from it, in a fine grassy flat, and encamped. (*Camp LXIV.*) The country generally is more open, with grassy box flats; melaleuca scrub is less frequent. As this camp appeared suitable for a halt of a few days, I decided on availing ourselves of the opportunity of killing one of the unserviceable horses, and replenish our stock of meat, as also to supply the party with fresh meat: "old Boco," who had not carried a pack since leaving the Albert, and whose wandering and kicking propensities had rendered him a very troublesome animal, was, therefore, shot, skinned, and quartered.

*Sept. 19.*—The horse was cut into thin slices and hung on ropes to dry by 10 A.M., the liver and heart furnishing the party with an excellent dinner.

*Sept. 20.*—The night had been cloudy, but the meat dried well, and promised to be fit to pack the following day. The weather was hot with little wind. Reduced the ration of flour to  $\frac{3}{4}$  lb. while fresh meat is abundant.

*Sept. 21.*—Resumed our journey at 8.15, and traversed on a course N.  $40^{\circ}$  E. m. A level open grassy country, thinly wooded with box, bloodwood and terminalia, &c.; the soil a good dark loam, but very wet in the rainy season. At 11.30 came to a large creek or river with many sandy channels, in which only a few small pools of water remained; followed it up to the E.S.E. through fine open grassy flats till 2.35 P.M., and camped in the bed of the river.

(*Camp LXXV.*) The banks of this river (which is probably the Gilbert of Leichhardt) are well grassed, and a dense line of melaleuca leucodendron, flooded gum, and morinda marks its course through the plain, but being divided into many channels its size is difficult to ascertain. Considerable quantities of mica are mixed with the soil on the banks, which indicates that it rises in a country of primary formation. Two kangaroos, some small wallaby, and also several pink crested white cockatoos were seen near the river.

*Sept. 22.*—Leaving our camp at 7·25, steered N. 120° E. m. across the plains on the left bank of the river, and at 1·30 camped at a small pool of water in the bed of the Gilbert, which is broad and sandy, retaining very little water. (*Camp LXXVI.*) Fragments of porphyry, quartz, black slate are abundant in the drifted gravel, and mica, iserine, and minute garnets exist in the bed of the river.

*Sept. 23.*—At 7·5 continued our route up the river's left bank, the average course S.E. by E. At 2·30 camped at a small pool in the bed of the river. (*Camp LXXVII.*) The principal channel is 200 yds. wide, and the several smaller channels occupy a breadth of half a mile; the banks are low, and the country quite level, thinly wooded with box trees; the grass good, but not thick; water is very scarce except by digging in the bed of the river.

*Sept. 24.*—At 7 A.M. steered S.E. and at 8 crossed to the right bank of the river, the channel 300 yds. wide, the banks about 15 ft. high, beyond which the country gradually declined, so that when the river overflows a great extent of country must be inundated. Continuing our course the river turned more to the S. and we passed through some poor stunted forest of eucalypti alternating with grassy box flats. At noon altered the course to S.E. and at 12·30 camped at a chain of small lagoons in the shade of some fine *norl*da trees. (*Camp LXXVIII.*)

*Sept. 25.*—At 6·35 steered S.E. through an open melaleuca scrub, the soil sandy loam thinly grassed; acacia, bloodwood, silver leaved ironbark, and *Grevillia* forming open patches of wood at intervals. At noon turned S. and at 1·35 camped at a small lagoon, nearly dry and  $\frac{1}{2}$  a mile from the bank of the river. (*Camp LXXIX.*) A few hills rose close to the S.W. of the river opposite the camp; the lower hills were grassy, and the higher ridges wooded, but they did not exceed 500 ft. above the level of the plain. The bed of the river is still broad, dry, and sandy, but the open box flats are much reduced in width, seldom exceeding 1 m. At 5 P.M. there was a heavy squall with thunder and lightning, followed by a cloudy night and a moderate breeze from the S.

*Sept. 26.*—At 6·45 resumed our route, and following up the

right bank of the river in a S.E. direction till 2, when we encamped in the sandy bed of the river, procuring water from a small hole in the sand. (*Camp LXXX.*) The country on the banks of the river consisted of box flats, some portions of which were well grassed, but usually very poor: this extended back about half a mile, and then changed gradually to a poor country with little grass, and wooded with small eucalypti and melaleuca; the soil gravel and sand. The bed of the river continued to be about 300 yds. wide, dry and sandy; and a line of flooded gum, morinda, and melaleuca trees mark its course, the deep green foliage of these trees contrasting strongly with that of the surrounding country.

*Sept. 27.*—Steered an average S.E. course up the river from 6.40 till 1, when we encamped at some pools of water in a side channel of the river, where it was divided by a hillock of slate rock. (*Camp LXXXI.*) The country is very inferior in quality, the flats narrowing to half a mile, with very dry and thinly scattered tufts of grass. The bed of the river is better defined, and often forms a single dry sandy channel 250 yds. wide: water was only seen in it once during the day's journey. Low rocky hills of sandstone gradually approach the banks, and near the camp porphyry, slate, and coarse granite formed detached hills 50 to 100 ft. high, seeming to indicate an approach to the ranges in which the stream takes its rise.

*Sept. 28, Sunday.*—Walked over from the camp to a low hill about 1 m. S.S.E. It was composed of granite at the base and capped with horizontal strata of sandstone, some of the beds containing large water-worn pebbles, and the superstratum highly ferruginous. To the S. W. of this hill the rock was slate, the strata nearly vertical, the strike N. and S., but much contorted. Large pebbles and boulders of porphyry, quartz, slate, granite, sandstone, and agate formed banks in the bed of the river. The country as seen from the hill was generally level in appearance, but consisted of numerous low ridges and hills of granite with sandstone summits. The valley of the river extended to the E. and S., and a large branch appeared to join from the S. about 10 m. lower down, as a valley and ranges of hills extended in that direction. The whole country had an arid and desolate aspect, as there were no large trees except along the principal watercourses, and many of the hills were destitute of other vegetation than small acacias and scrub trees, the bare rock showing through its scanty covering.

*Sept. 29.*—At 7.15 again steered E. up the river, the country level and timbered with stringy bark, box, bloodwood, leguminous ironbark, and rusty gum, the soil a red sandy loam thinly grassed. At 10.30 came to low hills and ridges of granite and porphyry, timbered with box, leguminous ironbark, terminalia, &c., the

grass somewhat improved. At 11 altered the course to the s., to close in with the river, but after crossing a great number of dry watercourses, and even steering w., only reached the bank of the river at sunset; the channel was dry, and all tree vegetation had disappeared: only a barren waste of sand and gravel 180 yds. wide, with bare rocky banks, showed that it had once been a running stream. A few small hollows in the rocks retained water from the late rain, but not sufficient for our horses; and though we found a small pool in the sand, it was too small to supply the party. At 6 camped in the bed of the river. (*Camp LXXXII.*) The geological structure of the country is dissimilar to any that we have yet traversed in North Australia. Granite, porphyry, and slate are the prevailing rocks: the whole appear to have been subjected to considerable disturbance, as the slate is much broken, contorted, and in parts altered by contact with the porphyry, and no definite strike or dip appeared to exist. The porphyry is of red or brown colour, consisting of a grey paste with crystals of feldspar, and angular fragments of slate and granite, sometimes more than a foot in length. The granite contains little mica, and the quartz is frequently arranged in rhomboidal crystals nearly parallel to each other. It readily decomposes, and from the predominance of quartz forms a coarse gritty soil. Quartz rock forms large beds and veins in the granite, and has a general trend N. and S.: it contains crystals of mica, and therefore is not likely to contain metals. In washing the sand of the river near the camp, only a small quantity of titaniferous iron remained after the removal of the quartz and mica.

*Sept. 30.*—Moved the camp about 1 m. higher up the river to some small pools of water, and then with Mr. H. Gregory ascended the hills to the S. of the camp. (*Camp LXXXIII.*) From the highest ridge the course of the river was visible for nearly 20 m., trending first 7 m. S.S.W. and then S.S.E.: at the bend a branch appeared to join from the W.S.W., in which direction the country appeared very flat for 15 or 20 m., as only a few distant hills were visible. From N. round S.E. the country was very broken and hilly, rising highest to the N.E., but the view was limited to 8 or 10 m. S.E. a valley opened through the hills, and more distant ranges were indistinctly seen beyond. The whole aspect of the country was extremely barren, rock forming the principal feature. Returning to the camp, we passed several large fig trees in full bearing, and we collected a quantity of the fruit, which was somewhat insipid, but by boiling them with sugar and tartaric acid formed an agreeable addition to our rice. At the camps of the blacks near this place we found large quantities of the seed-vessels of the *sterculia*, the seeds of which appear to be often eaten by them: the fruit of the *morinda* is also pounded and soaked in



water, to which, when fully ripe, it imparts an agreeable flavour. *Portulaca* is very abundant, and forms with us an important addition to our dried horse-meat, and has contributed much to the health of the party.

*October 1.*—Steering an average S.S.E. course from 7.40 till 2.10, camped on the right bank of the river, which first came from the S.W. and then from S.E., throwing off two branches to the S.W., and was thereby much diminished and reduced to 100 yds. in width at our camp. (*Camp LXXXIV.*) Only one creek and some small gullies joined from the E., although the country in that direction was hilly. The bed of the river is still dry and sandy, water being very scarce. Slate, quartz, schist, granite, and trap are the principal rocks, and by their decomposition do not form a soil favourable to vegetation, the country becoming more desolate as we advance: the only trees which retain their verdure are those on the immediate bank of the river.

*Oct. 2.*—The river above the camp coming from the S.S.W., it appeared desirable to pursue a more easterly course. I therefore started from the camp with Mr. H. Gregory to reconnoitre the country. Steering E. 3 m. over low slate hills (the strata dipping  $60^{\circ}$  to  $80^{\circ}$  S. by E.), we ascended a hill from which a range was visible 8 to 10 m. to the E., in which a creek took its rise, and joined the river near the camp. To the E.S.E., at the head of the creek, a gap in the hills showed a more distant range: steering in that direction came to the creek with a rocky and sandy bed 10 yds. wide and perfectly dry. Continuing our route ascended the hills, which were composed of gneiss, schist, and slate, and trap existed on the lower ridges. A large valley extended across our course to the E., beyond which a range of flat-topped hills bounded the horizon at 10 to 12 m. Descending to the E. the country improved, and granite was the prevailing rock, ironbark and a few boxtrees forming an open forest, which on some of the ridges was well grassed, the soil a good red loam. At 2 came on a small river bed, dry and sandy, and about 80 yds. wide. Following it down to the S. found a small pool of water in a hollow in the sand. Here we halted till 3.30, and then followed the river S.W., S.E., S.W., W., and S. At 6.10 ascended a hill from which we saw that the river turned W. and N.W. breaking through the hills and joining the Gilbert River. Having ascertained that we were still on a western watercourse, we bivouacked near the river without water.

*Oct. 3.*—At daybreak steered N.W., crossing several rocky ridges of hills, and at 2 reached the camp. Nothing of importance had occurred during our absence. The horses had improved much by the rest of two days.

*Oct. 4.*—At 7.15 left the camp, and following an average E.S.E. course for 7 hours, reached the pool found on the 2nd instant in

the upper branch of the Gilbert River and encamped. (*Camp LXXXV.*) As this route nearly coincided with that on the 2nd, nothing was observed worthy of farther notice.

*Oct. 5.*—At 6·45 left the camp and followed up the valley of the river in an E.S.E. direction for 3 m. : water was abundant in the gullies, owing to a heavy shower some days previous. Beyond 3 m. the water ceased, and the country was dry and parched. Low hills of schist, trap, and granite formed the country near the river; and farther back high ranges bounded the valley: these appeared to be flat-topped, and to have horizontal strata of sandstone on their summits. At noon the river had divided into several small branches, and the character of the country did not promise a supply of water within the space of a day's journey: we therefore returned down the river to the last water we had seen, and encamped about 3 m. N.E. of our last camp. (*Camp LXXXVI.*) As there was little prospect of finding water again till the range to the E. of our present position was crossed, I decided on reconnoitring the country. Before moving the party farther, and as the weather promised to continue fine, the horse "Monkey" was shot and skinned preparatory to drying the meat during my absence.

*Oct. 6.*—At 6·5 left the camp with Mr. H. Gregory. Steering nearly E., crossed the s. branch of the river, and reached the base of the higher range at 9·30; here we found a fine spring,  $\frac{1}{4}$  m. s. of a remarkable hill formed of a single mass of bare rock (porphyry), completely honeycombed by the action of the atmosphere. Ascending the range, which consisted of porphyry with horizontal strata of sandstone on the summit, we continued an E. course over rocky hills with small dry watercourses trending N. The grass was very thin and dry, and the country openly wooded with acacia, cypress, eucalypti, &c., none of which attain a large size. At 1·30 halted to rest the horses, and searching among the rocks in a gully obtained about three quarts of water by scraping in the sand. At 2·45 resumed our route, traversing a hilly country; and at 4·15 ascended a granite hill with a sandstone summit, from which the view was very extensive. Large valleys seemed to join and trend from s. to N., and were bounded by ranges except to the E., where a level plain or wide valley extended to the horizon. In the valley a line of green trees 5 m. distant marked the course of a creek. Descending the range we encountered a very rocky country with deep gullies, in one of which we found a few gallons of water, which our horses consumed. As there was no grass here we continued onwards till dusk, and bivouacked in a small patch of grass by the side of a dry gully. (*Bivouac.*) The country E. of the range is entirely granitic, very thinly wooded, and scantily grassed; the timber chiefly ironbark.

*Oct. 7.*—Continued an E. course at 5·50, and at 7·50 reached

the large creek, which was 100 yards wide with a shallow sandy channel; the banks low and thinly timbered with iron bark and a few box trees; the soil poor and sandy, producing little grass. Large casuarina and flooded gum-trees grew in the channel of the creek, which we followed down 3 m. to the N.E. without finding any water, and only two spots where it could be procured by digging; we then turned up the creek and formed a well at the most eligible spot, and procured an abundant supply of good water. At 2:20 commenced our return route towards the camp, and following up the spurs of the range found a practicable route for the pack-horses. Passed the highest part of the range at 6, and bivouacked at a small dry watercourse at 7:15 P.M. (*Bivouac.*)

Oct. 8.—Resumed our route at 6, and deviating to the N. of the outward track found a small pool of water in a rocky gully, following which downwards for a mile we came to a pool of water sufficient for the supply of the whole party. At 10:30 reached Bowman Spring at the foot of the range, and by digging in the moist soil obtained a little water. As we descended to the spring, a small party of blacks shouted to us from the summit of one of the hills, but did not descend to us, though we halted till 12:30, and then resumed our route, reaching the camp at 4, and found the party all well. The horse meat was quite dry and fit for packing. Bowman had also replaced the shoes of all the horses. The geological character of the country gradually changes, in consequence of the greater development of the older rock as we proceed to the eastward. At this camp gneiss, porphyry, and trap have superseded the slates; and, proceeding E., granite is visible at the western base of the range; this is covered by a thick mass of porphyry, containing large fragments of slate, gneiss, and granite in its lower beds, while the upper part has a fine even grain, and is of a lighter colour. Being deeply cracked by vertical fissures, it forms perpendicular columns of rhomboidal form resembling basalt. The summits of the higher hills are formed by horizontal beds of white sandstone, containing water-worn pebbles of quartz, &c. Granite supersedes the other rocks on the eastern slope of the range, and is there only occasionally interrupted by veins of dark trap.

Oct. 9.—Prepared to start from the camp at the usual time, but four of the horses could not be found, and owing to the rocky nature of the ground the tracks were not discovered till late in the evening, when tracing them some miles I found the stray animals at sunset in a secluded valley.

Oct. 10.—This morning we were more successful in collecting the horses, and started from the camp at 6:35. Steering an easterly course reached the foot of the range at 10:20, and the summit at noon. Following the previous track reached the pool

of water at 1, and encamped. (*Camp LXXXVII.*) Near this camp the Xanthorrhoea was first seen.

*Oct. 11.*—Leaving the camp at 7 steered an easterly course over a somewhat barren granitic country, timbered with cypress and ironbark. Passed close to a hill on the highest point of the range, which by approximate measurement rose to 2500 ft. above the sea level: then by a spur descended the range, and reached the well in the sandy creek at 1.5, and encamped. (*Camp LXXXVIII.*) Having cleared out the sand and banked up the sides of the well with stakes and brushwood, a plentiful supply of water was obtained at about 5 ft. below the surface of the dry channel.

*Oct. 12.*—At 7 steered N. 60° E. over undulating granite country, timbered with ironbark and box, the grass scanty and very dry. At 8.45 crossed a large creek coming from the S.; its channel was about 100 yards wide, dry and sandy, except where an occasional shallow pool existed; the bank steep and 10 to 20 ft. high. Crossing several small gullies trending N., at noon came on a dry creek also trending northwards; on its right bank was a level plain of cellular lava or basalt. Following the course of the creek at 1.50 camped on the bank of a fine lagoon,  $\frac{1}{4}$  m. long, 70 yards wide, and apparently about 10 ft. deep, although at the present time much below its usual level. (*Camp LXXXIX.*) A high range of hills exists to the N. of this creek, and the water courses all trend to the N.W.; and, as our latitude is the same as the “reedy brook” of Leichhardt on the S.W. side of the “valley of lagoons,” it is evident that these streams are not tributary to the Burdekin, but probably form the head of the “Lynd River.”

*Oct. 13.*—At 6.25 steered E. and traversed a slightly undulating granitic country, with small watercourses trending W.S.W. Ironbark and box formed an open forest, the soil poor and gritty, but with patches of black soil with blocks of lava on the surface. At 11.15 reached a small hill of lava, from the summit of which the country appeared very level to the E. To the N.E. large hills rose about 12 m. distant. Ranges of hills also bounded the plain to the S., and some distant summits were visible to the S.E. Continuing an east course, lava became more frequent, and at length formed the whole surface. At 2.30 came on several streams of ancient lava, forming ridges of rugged rocks, which were crossed with some difficulty. These streams of lava appear to have come from the N. from the high land several miles distant, the thickness varying from 20 to 30 ft. and the breadth irregular. The level ground was lightly timbered with ironbark and box. At 5.25 turned to the S.E., following a small gully; passed a small native well with about one pint of water in it, and the nature of the rock prevented its being enlarged. (*Camp xc.*) At 6.15 camped near

some large granite rocks, in the hollows of which 5 or 6 gallons of water had collected during a recent shower. Walking down the creek  $1\frac{1}{2}$  m. in search of water, I found two small pools; but the broken nature of the ground and the darkness of the night prevented the party being moved to them till morning.

Oct. 14.—Moved the camp to the water-holes found last night  $1\frac{1}{2}$  m. down the gully. (*Camp xci.*) The country here is of granitic formation, undulating and moderately grassed, and wooded with box and ironbark. The day was cloudy, but cleared at night, and I took observations for time, latitude, and lunar distance. Chronometer 2287 would not wind up in the morning, and stopped during the day; but, having run down, wound up again without difficulty.

Oct. 15.—Resumed our journey at 7.10, and followed the course of the creek to the s.e. On its n.e. side was a basaltic plain, and the s.w. consisted of ridges of granite with sandstone on the summits. Several small creeks joined from the s.w., and increased the principal channel considerably. At 10 the country was more level, and openly timbered with box, ironbark, and bloodwood. Grass was abundant and green, owing to heavy rains, which appeared to have been accompanied with hail, as the w.n.w. sides of the trees were much bruised, the soil indented, and a great portion of the leaves and small branches torn from the trees. At 1.15 camped on a small tributary creek. (*Camp xcii.*) The country appears to consist of granite and mica-schist, with beds or streams of lava, which have come from the ranges to the n. and have advanced to different distances into the more level land. The surface of the lava is more thinly wooded and better grassed than the granite, but the scarcity of water and the roughness of the surface render it less convenient for travelling. From one of the higher ridges we had a wide but imperfect view of the country, but the air being misty, only a few of the marked outlines of the ranges to the n. were visible. To the e. a high hill 25 m. distant rose beyond a level wooded country. At 6 there was a heavy thunder-shower, which caused the gully to run for several hours.

Oct. 16.—The rain having passed away the morning was clear and cool, and at 6.35 we resumed our journey, steering an average s.e. course, crossing the creek several times, and at 11 reached the bank of the Burdekin River, which had a strong stream of water flowing in its channel, which here is about 100 yards wide, but full of casuarina and melaleuca trees; the banks steep and deeply cut with gullies. Following the river to the s.e., at 2 camped in a large open grassy flat a mile from the river, obtaining water from a small pool of rain-water filled by the shower last night. (*Camp xciii.*)

*Oct. 17.*—At 6·30 resumed our journey, steering E. and S. for two hours over level flats; then turning E. crossed a steep range of sandstone hills, the strata nearly vertical, the strike N. and S. Thin veins of quartz intersected the rock in every direction, and formed a complete network. The steepness of the country compelled us to turn N.E. to the river to avoid the rocky hills, and we followed the stream to the S.E.; the banks were high and cut by deep gullics. At 12·30 the hills receded, and we entered some fine flats. Here I picked up a fragment of the bone of a bullock, and observed several trees that had been cut with iron axes; and as the latitude corresponds with that of Leichhardt's camp of the 26th April, 1845, the bone doubtless belonged to the bullock he killed at that place. At 1·5 camped on the bank of the river. (*Camp xciv.*) The Moreton-Bay ash, poplar gum, and a rough-barked gumtree with very green leaves, were added to the ironbark, bloodwood, and other eucalypti which constitute the forests, while casuarina and *melaleuca leucodendron* grow in the beds of the larger watercourses. The channel of the river is about 150 yards wide, with a small stream of water winding along its sandy bed. Much of the running water is due to the late rain, but it is evident that it continues to run throughout the year, as the character of the vegetation indicates a constant supply of water.

*Oct. 18.*—Continued our route at 6·25, and steering nearly E. till 8·30, when the river turned to the S. round some sandstone hills, crossing which we again reached the river at 10·5 flowing to the S., with fine openly timbered flats on both banks. Steering S. till 1 camped on the bank of the river just below a ridge of slate rock which crossed the channel. (*Camp xcv.*) From the hills at 9 we saw a large valley joining that of the Burdekin from the E.; it was bounded by a steep range on the S., which terminated about 2 m. from the river. S.W. of our position were several flat-topped hills, which appeared to be a continuation of the range crossed yesterday. To the S. only a few distant hills were seen, the view being obstructed by trees. The flats on the banks of the river are well grassed, and openly timbered with ironbark, Moreton-Bay ash, bloodwood, and poplar gum; the soil varying from a soft brown loam into which our horses' feet sunk deeply, to a firm black or brown clay loam. The ridges are stony, thinly grassed, and timbered with box and ironbark. The geological features consist of a fine-grained sandstone, interstratified with slate and coarse conglomerates. The sandstone is intersected in every direction with veins of quartz, which do not appear to enter the slate. The dip of the strata is nearly vertical, the strike N. and S. The whole appear to have been much disturbed and altered. Neither granite nor trap have been observed since yesterday

morning. Consumed the last of the dried horse-meat, and increased the ration of flour to 1 lb. per diem.

*Oct. 19, Sunday.*—Remained at the camp to rest the party. The day was cloudy, with variable breeze from s.e. to n.e. and n. No observations for latitude could be taken till early on Monday morning, and even then the altitudes were imperfect. The stream of running water in the bed of the river has increased, but is still quite clear.

*Oct. 20.*—Resuming our journey at 6.40, steering s.e. through fine grassy flats till 10, when we crossed the "Clarke" River and altered the course to e., over well-grassed flats to the foot of a rocky range of sandstone hills, which we reached at noon, and ascended by a steep spur, and at 2.30 attained the highest ridge. Here sandstone was the prevailing rock, and xanthorrhœa, silver-leaved ironbark, and triodia formed the principal vegetation. Descending gradually, at 3.30 reached a small creek with a patch of good green grass on its banks, and at 3.45 halted at some small water-holes which appeared to be permanent. (*Camp xcvi.*) Except near the creek the country was poor and stony, with an open forest of ironbark and box trees. The country between the Burdekin and the Clarke appears to be of excellent quality, consisting of well-grassed flats timbered with ironbark, Moreton-Bay ash, poplar gum, and box. The "Clarke" about 100 yards wide, with a sandy bed crossed by ridges of slate rock. The banks are 60 to 80 ft. high, and the marks of last year's floods 30 to 35 ft.; the trees were much bent and broken by the force of the current. More water appears to come down the Clarke during floods, but the Burdekin has a more constant stream; the Clarke containing only shallow pools separated by dry sand and rocks. After leaving the immediate vicinity of the river the country was very poor and stony; the late rains had not extended so far, and the grass had the dry and parched appearance which characterized the country on the banks of the Gilbert.

*Oct. 21.*—At 6.15 resumed our journey and traversed an inferior country of sandstone and porphyry, thinly wooded with box and silver-leaved ironbark, triodia in a great degree superseding the grass. In crossing one of the gullies in which were some pools of water, Bowman's horse fell over the bank into one of them, and he got some severe bruises. At 10.15 came on the river where it ran over a ledge of rocks forming a succession of cascades, below which it spread out into a wide sheet of sand  $\frac{1}{4}$  m. in breadth, and then turned to the s. As Bowman had fallen some distance in the rear of the party, I selected the first suitable spot, and at 11 encamped; shortly after which Mr. H. Gregory came in with Bowman. (*Camp xcvi.*) On the bank of the river we saw two black gins, who climbed a tree on our

approach, and in the afternoon came to the camp with an old man. After some unintelligible conversation, they departed to their camp. They had no clothing of any kind, and the only weapon carried by the man was a throwing stick of the same form as those used by the blacks on the southern shores of the Gulf of Carpentaria. The geological character of the country is sandstone, much altered by contact with porphyry, which has been forced through it; both the dip and strike are confused, and could not be ascertained to have any general direction or angle except in the bed of the river, where the strata dipped  $10^{\circ}$  to the N., but in the hills on the left bank below the camp the strata were horizontal. The river is now about 150 yards wide in the narrower parts, with a narrow stream of water (10 to 20 yards wide) 1 foot deep, running in a winding course through the sand, and sometimes expanding into sheets of water occupying the whole breadth of the channel. At 6.15 steered S. and followed the right bank of the river; for the first hour the country was hilly on both banks, with deep gullies; it then became more level, and opened into well-grassed flats: the timber box, Moreton-Bay ash, and ironbark; the soil a light brown sandy loam, very soft from the numerous excavations of the funnel ant. These flats extended from 1 to 2 m. back, and the country then rose into low ridges of poor land, timbered with ironbark and box. Crossed a sandy creek coming from the W., and at 1.30 camped on the bank of the river. (*Camp xcvi.*) A short distance from the camp we surprised a black with his gin and a child. The man climbed a tree, and the woman ran away with the child, leaving a small water-vessel hollowed out of a piece of wood, and a calabash full of water. The rocks near our last camp were sandstone and porphyry; in the only exposed section the sandstone dipped  $5^{\circ}$  to  $15^{\circ}$  to the N. We also crossed a hill of porphyry, which was remarkable for the regularity of its cleavage into thick laminae, which were vertical, with a strike N. and S.; but though it had the external appearance of a stratified rock, its structure was perfectly crystalline. About noon granite with large plates of mica was observed in some of the gullies.

*Oct. 23.*—At 7 steered S.S.E. over ridges of sandstone timbered with ironbark and thinly grassed, for the first  $1\frac{1}{2}$  hours; and then again struck the river, passing at the foot of a limestone hill, the rock of which contained fossil shells and corals. Altering the course to S., traversed fine open flats  $\frac{1}{2}$  to 1 m. wide, beyond which the country rose into low ridges of limestone. At noon basalt appeared, covering the limestone and sandstones. The steep slopes which bounded this rock were very rugged, but the level surface was well covered with black soil producing excellent grass. At 12.55 camped in a fine grassy flat, walled in by steep basaltic rocks. (*Camp xcix.*) We experienced some difficulty



in watering the horses, as the banks of the river were so steep that they frequently fell back into the water in attempting to ascend the bank. The limestone rocks seen on this day's journey appear to rise from beneath the sandstone (some of which are so hard and close grained as to have the appearance of quartz). The limestone dips about  $10^{\circ}$  to the w., and some of the adjacent sandstones  $20^{\circ}$  w. in well-defined strata. The basalt covers all the other rocks, filling up the former inequalities of surface, and forming a perfectly level plain. Where the softer sandstones were in contact they were only baked into a coarse, brick-like mass which had much the appearance of having been formed from the alluvial banks of the river.

*Oct. 24.*—Leaving our camp at 6 steered s.s.e. over well-grassed basaltic flats thinly timbered with ironbark, &c., the soil a red loam. At 9 came to a large reedy lake or swamp, with considerable patches of open shallow water, on which were great numbers of ducks, geese and pelicans, &c. A broad and deep stream flowed from the lake to the s.e., varying from 30 to 80 yards in width, with a broad belt of reeds along the margin, beyond which the ground rose about 50 ft. to the level surface of the basaltic plain. Following the various windings of the stream till 10:35, crossed it at a ledge of basaltic rock, where it formed a fine rapid with a vertical fall of 8 or 10 ft. Beyond the running channel a dry sandy creek ran parallel at 80 to 100 yards distance. Our course was now between the creek and the steep rocky edge of the basaltic plain, which was too rugged for ascent with the horses till 11:20; we then crossed the plain, passing to the s. of a shallow open lake about  $\frac{1}{2}$  m. in diameter. The country was now very scrubby, with patches of grass. Altering the course more to the e., we again entered an open ironbark forest, and at 2 crossed a dry sandy creek, beyond which the country was poor and sandy, with pandanus growing on the ridges. On the banks of the creek we observed the marks of a recent camp of a large party of blacks; and a patch of ground was cleared of grass, and the surface scraped into ridges for a space of 30 yards long by 20 wide; the whole was covered with foot-prints, which showed that some ceremony or dance had been performed by a large body of men. At 3:30 entered a dense scrub of small crooked eucalypti and acacia, with a few *stereulia* or bottle trees. After losing an hour in attempting to penetrate the scrub, we turned n. to the dry creek and followed it down till 7, when we camped near a pool of water: but the night was so dark that the horses could not approach the water with safety, the bank being steep, and rendered very slippery by a slight shower. (*Camp c.*)

*Oct. 25.*—The grass having been recently burnt near the camp, the horses had strayed considerably, and we did not start till 7:30,

when steering E. we soon came on the Burdekin, which turned to the s.s.w. and s.e. The basalt rocks approaching the river, we were compelled to cross a very rocky ridge, beyond which we passed a deep pool of water 80 yards wide and  $\frac{1}{2}$  m. long; it terminated in a dry stony channel which connected it with a sandy creek which joined the river. Crossing a granite ridge we camped in a fine grassy flat on the bank of the Burdekin; the banks were high and steep, but the water easy of access. (*Camp CI.*)

*Oct. 26, Sunday.*—Remained at the camp. During the day there was a succession of showers without thunder, the clouds and wind from the E. At 10 P.M. the rain ceased, but the night continued cloudy.

*Oct. 27.*—The morning was cloudy with light rain till 7. At 7-30 steered E.S.E. and E. over a fine grassy country, consisting of granite and trap-ridges, timbered with ironbark, box, Moreton-Bay ash, and bloodwood, the river taking a sweep to the N. of the track, but at 10 we came again on its bank. The course was now S. till 2-15, when we crossed a large stream bed coming from the s.w., with a sandy and rocky channel 40 yards wide, containing small pools of water. Below the junction of this tributary the river turned to the E. and E.N.E. We crossed several ridges of trap, granite, and porphyry, which came down from the high land to the bank of the river, and at 3-30 encamped. (*Camp CII.*) The whole of the country traversed this day was well-grassed except about 1 m. of Bauhinia scrub, which did not appear to be of any considerable extent. Ironbark, Moreton Bay ash, and bloodwood formed the principal trees, with which the country was openly timbered. The prevailing rock is granite intersected by veins of dark trap, and in the latter part of the day's journey porphyry and schist were observed, and concretions of lime existed near the trap veins. The soil was a light gritty loam except on the trap rock, where it was a rich black soil. The available country hereabouts appears more extensive than higher up the river. More rain had fallen in the early part of the season, and the grass is rich and green, especially where it has been burnt off by the fires last year.

*Oct. 28.*—We resumed our journey at 6-25, steering an E.S.E. course; but after crossing some fine grassy ironbark-ridges, entered a dense scrub of acacia, sterculia, Bauhinia, and thorny shrubs. Turning N., with some difficulty extricated the party from the scrub, and then skirted it to the E. along the banks of the river till 9-10, when the scrub receded, and fine openly-timbered ironbark ridges replaced the scrub. These ridges were well grassed; the rocks granite, trap, and porphyry. The country generally appeared well suited for stock. No high ranges were visible. At 2-45 camped in a fine grassy flat, part of which having been

burnt was now covered with excellent green grass. (*Camp ciii.*) The day was cool and cloudy, with light showers from the E. The granite was fine grained and intersected by veins and masses of trap, and in the latter part of the journey porphyry was superincumbent. In the scrubs, sandstone prevailed; it was coarse grained, and contained rounded boulders of quartz, granite, slate, and hard sandstone.

*Oct. 29.*—As the river turned to the E. below the camp, at 6.20 steered E.S.E. and S.E. till 9.30, when we again came on it, trending S. The country consisted of openly-timbered and grassy ironbark ridges, but not equally good with that passed during the last two days. The river at 10 turned to the S.E. along the foot of some steep rocky hills of porphyry resting on granite, and at 11.45 was joined by a dry creek 20 yards wide coming from the S.W. Our course was now E.S.E., passing with difficulty between the river and a steep granite hill, beyond which the country became more level and sandy, rising to the S. in long gentle slopes scantily grassed, and timbered with bloodwood, ironbark, Moreton-Bay ash, and poplar gum, with a few scattered pandanus. Many deep gullies intersected the ground, cutting deeply into the granite beneath the soil, and rendering it very difficult and fatiguing to traverse. A fine range of openly-wooded and grassy hills rose from 1 to 3 m. from the left bank of the river, attaining an elevation of from 500 to 800 ft. above the river. These hills are probably porphyritic; they are named "Porter Range" on Leichhardt's map. At 2.45 camped on the Burdekin River. (*Camp civ.*)

*Oct. 30.*—At 6.30 steered N.  $120^{\circ}$  E. m., but at 7 came again on the bank of the river, which now turned S.; the country became more rugged, and rocky hills closed in on both banks of the river, forming a deep gorge through which it had forced a passage. By keeping at back of some of the hills we avoided much of the rocky ground, crossing (at noon) a high ridge, from which we had an extensive view, extending to the junction of the Burdekin with the Suttor River, Mount McConnel bearing  $159^{\circ}$  magt, and the W. end of Porter Range  $334^{\circ}$  magt. A long range appeared to extend from Robey Range and bound the valley of the upper Burdekin to the N. of E., while a high range seemed to trend N.E. from the eastern side of the Suttor Valley and turn the course of the Burdekin to the northward. Continuing our route nearly S.E. over several steep rocky ridges, we camped in a fine grassy flat a quarter of a mile from the Suttor River at 1.50, Mount McConnel bearing N.  $172^{\circ}$  E. m. (*Camp cv.*) About 10 A.M. we heard some blacks calling in our rear, and soon after they came in sight, but would not allow any of the party to approach them; till one of the party cantering up towards them,

some climbed the trees, when we made signs to them that it was desirable that they should pursue an opposite course to ours, and we then left them to descend at their convenience. The country traversed this day was of a broken character, with deep gullies and rocky hills near the river, but was generally well grassed and openly timbered with ironbark and Moreton Bay ash. Granite forms the base of the hills, and is covered by masses of porphyry, forming hills with rocky summits of columnar structure as at the head of the Gilbert River. A dark-coloured trap changing into porphyry formed some of the lower ridges, and was largely developed on the bank of the Suttor River. Thin veins of calcareous spar and quartz intersect the granite. The bed of the Burdekin where we last saw it (1 m. above its junction with the Suttor) is half a mile wide, with a shallow stream of water varying from 20 yards wide to the whole breadth of the channel, which was very level and sandy. The Suttor is but a small river compared with the Burdekin. Near the camp it formed some fine reaches of water 100 yards wide, but of no great depth; the trees on its banks were much broken and bent by a flood which had occurred within the past year. Considering the number of miles we have travelled along the banks of the Burdekin, few impediments have been encountered, while the extent of country available for squatting purposes is considerable, with the advantage of a never-failing stream of water throughout the whole distance.

*Oct. 31.*—A rainy night was followed by a thick fog in the morning, so that when we started at 6.30 it was with difficulty that the deep gullies on the banks of the Suttor were avoided. Steering s.w. for 1 hour, crossed to the right bank of the Suttor River, and then by an average s. course passed to the w. of Mount M'Connel, which by its isolated character and height (about 600 ft. above the valley) forms a very conspicuous landmark. It is wooded on the summit, and has some fine patches of grass on the slopes, with cliffs of porphyry near the upper part, this being the prevailing rock on the right bank, while shaly rock with dark trap and veins of calcareous spar and limestone prevail on the left bank of the Suttor. The country on both sides is well grassed and openly timbered with ironbark. The bed of the river is very irregular and sandy, with small shallow pools of water at intervals. At 11 the river came from the s.w., but, continuing a s. course, we crossed some fine basaltic plains covered with excellent grass and separated by open box-forest. At noon crossed a sandstone hill, the base of which was porphyry. Then traversing ironbark ridges for an hour crossed a sandy creek from the E., and at 1 encountered the first brigalow scrub. Through this scrub we steered s.w. till 3.40 and camped on a small dry creek with a narrow grassy flat. (*Camp cvl*) Water was obtained from a small gully, where

it had lodged during a shower the previous night. The country till we reached the brigalow scrub was well adapted for pastoral purposes. The rocks trap, slate, and porphyry, with veins of limestone. The brigalow grows on the detritus of a coarse conglomerate, the larger boulders of which lay scattered over the surface; they consist of trap, porphyry, quartz, and sandstone, and have the appearance of being waterworn. A range of hills, apparently sandstone, bounds the valley to the E. from 3 to 7 m. from the river; they have no great elevation, but we did not get a good view of them from any point on our day's journey.

*Nov. 1.*—The horses had strayed so far into the scrub in search of grass, that it was 9.40 before they were collected and saddled. We then steered s. and s.w. through the scrub, which gradually became more open, and at 11.15 we again reached the river, coming from s.e.; following it up, it gradually turned to s. and s.s.w. Two creeks joined the river from the E., but neither of any importance. The brigalow scrub came close to the bank of the river, only leaving the narrow flats open. Of the w. side of the river we could see little, except that it consisted of wooded ridges and scrub. To the E., at the distance of from 1 to 3 m., rocky hills of moderate height existed, and from their flat tops and red cliffs near their summits evidently consisted of sandstone in horizontal strata. Sandstone also was exposed on the bank of the river with a dip of  $30^{\circ}$  to s. At 3.30 camped on the right bank of the Suttor, where a fine grassy plain extended about half a mile back, and was covered with beautiful green grass. (*Camp CVII.*) Water was abundant, as the river had been running during the past week, and had filled the hollows in the channel, but had now ceased to flow. The channel is very irregular, and consists of from 3 to 6 small channels, which separate and rejoin each other so as to form a complete network, with occasional isolated hollows; being free from scrub, the bed of the river was excellent travelling ground, large flooded gum and melaleuca-trees affording an agreeable shade.

*Nov. 2, Sunday.*—Grass and water being abundant, we enjoyed a day of rest, remaining at the camp. Several cockatoos were shot; they were similar in colour and form to the sulphur-crested cockatoo of the Victoria and Gulf of Carpentaria, but larger in size.

*Nov. 3.*—Leaving the camp at 6.35, followed the river in a southerly direction till 11, when it turned to the E., and we ascended a sandstone hill, from the summit of which there was a fine view of the surrounding country. To the E. several very distant peaks and hills were visible; the most remarkable bore N.  $86^{\circ}$  E. mag.; to the s. a low range about 30 m. distant, with one large peaked hill, bounded the horizon, the intervening country

being very level and apparently covered with scrub; to the w. the valley was bounded by low hills apparently of sandstone. Although open ironbark ridges were frequent, the general character is very scrubby, and this, combined with the scarcity of permanent water, will ever render the country unavailable for pastoral purposes. Descending the hill, steered s.e.; crossed a fine basaltic plain and entered an open brigalow scrub, and at 2 reached the left bank of the Suttor, which had completely altered its character, consisting of a level grassy flat with uncertain limits, and intersected by long water holes, which were mostly dry; the general course from s.s.w. At 3:30 camped at a fine water-hole; 2 m. below the camp we saw some blacks, who decamped, and ran into the scrub. (*Camp CVIII.*) The country along the river consists of open flats thinly grassed in with large patches of salt-bush (*atriplex*), and openly timbered with box and flooded gum, while ironbark, box, and brigalow acacia prevail over the rest of the country. The marks of iron tomahawks are frequent where the blacks have been cutting honey or opossums out of the hollow branches of the trees.

*Nov. 4.*—Steering s.w. from 7:40 till 8:5, the river turned suddenly to the s.e., and, changing the course to 170° mag., traversed an open brigalow scrub with several shallow channels winding through the scrub in an irregular manner. At 10:30 again came on the principal channel of the river, which was running and very muddy from the effect of recent rains in the upper part of its course. The banks are very low, and the country so level that the floods must frequently extend more than a mile back into the scrub, which comes close to the bank on both sides. Box and flooded gum-trees grow along the larger channels, and box-flats sometimes extend into the scrub. We now followed the river to the s.s.w. through level country covered with dense brigalow, passing only one low rocky hill on the left bank at 11:20; at 2:15, the river having diverged to the eastward, we altered the course to s.; the country was more open, and at 3 we encamped on one of the side channels of the river, in a fine grassy box-flat. (*Camp CIX.*)

*Nov. 5.*—Steering s.e. for a quarter of an hour reached the main channel of the river, which we followed to the s., crossing at 7:20 to the right bank; the river soon diverged to the westward, and at 9:15 a dense brigalow scrub forced us to steer s.w. till we again attained the bank of the river at 10:30, and a s. course again pursued till 1, when a s.e. course was again adopted in order to close in with the river: reaching it at 4, and following s.s.e. till 4:50, encamped on its bank on the edge of a grassy flat of some extent. (*Camp CX.*) The whole country is very level and covered with dense brigalow scrubs, except where a sandy

plain occurred, on which triodia was more abundant than grass. Having passed the latitude of Sir T. L. Mitchell's last camp on the Belyando, and thus connected his route with the explorations of Dr. Leichhardt, I considered it no longer desirable to follow this river upwards, and therefore decided on pursuing a south-easterly route to Peak Downs and the Mackenzie River.

Nov. 6.—At 6:30 steered s., crossing the river, which turned to the s.w., passing through brigalow scrub till 9, then entered a box and Moreton Bay ash flat, in which was a small gully with pools of rain water, near which a camp of blacks were seen, but they ran into the scrub on our approach. At 9:30 changed the course to s.e. towards some rocky hills, which we reached at 11: from one of the ridges we saw several distant ranges to the westward, but the intervening space of 20 to 40 miles was very flat. Our route was now over scrubby hills of sandstone for 3 hours, and then descending into an open flat timbered with box, bloodwood, and Moreton Bay ash, triodia and grass growing on a sandy loam. The flat gradually became scrubby, and at 3:30 came to a small creek with a pool of rain water in the channel, and encamped in a small grassy flat, the creek trending to the n. (*Camp cxl.*) In crossing the sandstone range we had an occasional view of some high peaks 20 to 30 m. distant to the s. and s.s.e., but to the e. the country was perfectly level.

Nov. 7.—The horses having kept near the camp we started at 6:5, steering s.e. The whole country appeared perfectly level, covered with brigalow scrub, with open patches of sandy soil producing triodia and a little grass; the timber, Moreton Bay ash and box. Towards noon these openings became more frequent. At 1:30 passed a shallow pool of rain-water in a hollow at the edge of a scrub. Having watered the horses, we proceeded onwards for about a mile, when Melville's horse fell and rolled on him; he was much bruised, and as the extent of injury could not at the moment be ascertained, we returned to the pool of water and encamped. (*Camp cxli.*)

Nov. 8.—The supply of water being exhausted, I determined to move on to the next suitable spot for a camp, and halt till Melville had somewhat recovered from the effect of his fall. At 7:35 steered s.e., the country becoming more open as we advanced, and thinly timbered with ironbark, box, Moreton Bay ash, and bloodwood. The soil a red sandy loam, full of the holes of the funnel ant, thinly grassed and with patches of triodia. At 8:30 reached a fine creek of running water 20 yards wide, with steep banks. The water being muddy showed it to result from recent rain, and it probably rises in the high ranges seen to the s.s.e. Grassy flats extend along the bank of the creek, but are backed by brigalow scrub. Having selected a suitable spot on the right

bank of the creek, we camped at 8.45. (*Camp cxiii.*) The weather being fine and dry we killed the filly, which was now 11 months old and in excellent condition. By noon the animal was cut into slices and hung up to dry. The meat was excellent, and exactly like veal; being very juicy, a portion was slightly boiled to facilitate the drying, and at night the meat was placed on a frame of small sticks and a charcoal fire maintained under it by the watch. Dean was fully employed in repairing the harness, all the spare flour-bags being devoted to patching the saddle-bags, which had been much torn in travelling through the scrubs. Bowman replaced the shoes of the horses. Many of the horses have hurt their legs in crossing the fallen trees in the scrub, and several are very lame from this cause.

*Nov. 9, Sunday.*—Remained at the camp. Melville appeared to be recovering, but is still very stiff and scarcely able to walk. The weather was fine and warm, and the meat dried well.

*Nov. 10.*—At 7.10 we left the camp and followed the creek for an hour s.s.e., and then steered s.e. through open brigalow scrub, which gradually changed to open ironbark and box flats, well grassed. At 2 came to a broken country covered with very dense scrub of acacia and ironbark; deep gullies intersected the country in every direction. At 3.30 ascended a ridge of mica schist, from which a high range was seen to the s.w. 20 m. distant, but the acacia scrub was so dense that the view was very imperfect. Following down a valley to the s., s.w., w., and n.w., at 5.15 camped at a small pool of rain-water in a watercourse trending n.w. through rich grassy ironbark flats, the hills being covered with dense acacia scrub. (*Camp cxiv.*) It was evident that we were approaching the waterparting between the Burdekin and the Fitzroy Rivers, and hoped soon to emerge from the vast tract of scrub which occupies the valley of the Suttor almost to the junction with the Burdekin. The acacia scrub on the ranges differs from the brigalow of the plain, having a smoother and more slender stem, the leaves smaller and a deeper green colour. The soil is of a better description, producing good grass, especially in the valleys. On the plain we observed that full one-half of the box-trees had died within the last three years, and that it was not the effect of a bush-fire, as the old timber which lay on the ground was not scorched.

*Nov. 11.*—Leaving the camp at 6.30 we steered s.e., over ironbark ridges of a very scrubby character, with open grassy flats in the valleys. The ridges gradually increased in height, and at 11 the highest point was attained, from which we saw Peak Range, about 30 m. to the n.e.; to the n.w. the view was obscured by wooded hills, but from n. to e.s.e. the country appeared to consist of low wooded ridges for about 10 m., beyond which



fine, open, grassy plains extended from E.N.E. to E. along the foot of the Peak Range: from E.S.E. to S. low wooded ranges, 10 to 15 m. distant, intercepted our view. Descending from the range, we followed a small watercourse to the E.S.E. for nearly 2 hours, when the watercourse being considerably enlarged turned to the N.E., and at 2:30 we encamped in a fine grassy flat, obtaining water from a pool of rain-water in a tributary gully, the larger channel being dry. (*Camp cxv.*) The country generally consists of low ridges of schist, which forms by decomposition a gravelly loam, the gravel being derived from thin veins of quartz which intersect the schist in all directions. Ironbark and tall-stemmed acacia, with broad leaves, formed the forest, and grass was everywhere abundant. The great quantity of dead and splintered wood lying on the ground in the brigalow scrubs traversed during the past week has injured the horses' legs severely, and 6 have been lamed from this cause; some so severely that they had to be relieved of their loads.

*Nov. 12.*—At 7:25 steered N.  $110^{\circ}$  E. magnetic over grassy ironbark ridges, with small watercourses trending N. At 11 entered a dense brigalow scrub, with a few large Moreton Bay ash-trees; the soil very poor, and derived from the decomposition of a coarse conglomerate; small watercourses trended to the S. At 12:45 emerging from the scrub into an open box country, with limestone, quartz, gravel, and soft black soil, producing rather dry and scanty grass. At 1:45 entered an open plain well grassed, and with limestone ridges covered with bottle-tree scrub. The grass was good, and at this season green, but much mixed with *salsola*. The summits of Peak Range showed clearly above the ridges, and from the remarkable cliffs which exist round the summits of several of the hills they appeared to be capped by a thick bed of red sandstone or porphyry. There being little prospect of finding water in an easterly direction, at 4 altered the course to S.E. The air had been very hot during the day, with a light breeze from N. and N.E., which brought up a heavy thunder squall and a smart shower, but the ground was so dry that the rain was instantly absorbed. At 5 came to a watercourse trending S., but from the nature of the soil no water remained in the channel. We followed it down till 6:30, and encamped without water. (*Camp cxvi.*) About a mile from the camp we observed a small tree marked (A B), and near it a large sheet of bark, that had been cut about 2 years.

*Nov. 13.*—Resumed our journey at 6:30, steering S. down the watercourse. At 7 saw some blacks, who pointed down the creek and also into the scrub when asked by signs where water was to be procured, but they retreated into the scrub on the approach of the pack-horses. Proceeding onwards at 9:20 came to a pool of




water caused by a recent shower, and camped. (*Camp cxvii.*) The country near the camp was very poor and scrubby, with large Moreton Bay ash-trees; the soil formed by the decomposition of coarse sandstones and conglomerates, with intervals of trap and schistose rock.

*Nov. 14.*—At 6.50 steered s.e., the creek turning to the s. We soon entered grassy plains, with ironbark ridges, and patches and belts of acacia scrub; trap and limestone existing in the plains, and sandstone on the ridges. At noon, after passing through a belt of cypress trees, entered extensive grassy downs covered with beautiful green grass. Following a shallow water-course we passed some blacks at a distance. The search for water was unsuccessful till 4.20, when, finding a small pool of rain-water, we encamped. (*Camp cxviii.*) The country to the n.e. of our track appeared very level, and the grassy downs probably extend to the foot of Peak Range. To the s.w. it appeared to be a fine open country for 3 to 8 m., and then rose into wooded hills of moderate elevation, at the base of which a creek, probably the one we last camped on, appeared to run to s.e. If this part of the country were well supplied with water, it would form splendid stations for the squatter, but from its low character and geological structure permanent surface water is very scarce, and where it does exist is surrounded by scrubby country, which renders it almost unavailable.

*Nov. 15.*—Starting at 6.40 on an e.s.e. course soon entered an open acacia scrub, with fine grassy openings clear of trees; the soil a fine black loam, limestone, trap, and quartz pebbles occurring on the surface in the open plains. At 9.30 entered a fine box flat, and passed some pools of water in the creek. The flat extended e. 3 m., and we then entered a very scrubby tract of country, the soil a black mould, with much salsola growing even in the thick scrub. At 11 came on a fine creek from the n., with permanent pools of good water, but the banks, though grassy, were covered by an acacia scrub and a few box-trees. Changing the course to s.e., at 12.20 came to a fine river with high grassy banks, and several narrow deep channels, which were now full of water and running. In consequence of the late rains it had been slightly flooded this season, and the previous year had risen full 25 ft. above the present level. This is the "Mackenzie" of Leichhardt. The course of the river for 2 m. was e.s.e., and we crossed to the right bank without much difficulty, the bottom being firm and the bank sandy, though steep. Continuing to follow the river, at 2.40 camped. (*Camp cxix.*) The country on the bank of the Mackenzie is scrubby, with occasional open flats, with box-trees and grass. The scrub is principally acacia. The little lemon-tree was in full fruit, which, though only half-an-inch in diameter, was

excellent eating when boiled with sugar. The day was cool and cloudy, and at night it rained lightly for several hours.

*Nov. 16, Sunday.*—Remained at the camp. The morning was cloudy, but cleared towards noon, and I was able to ascertain the latitude.

*Nov. 17.*—Resumed our journey at 6:30 A.M., following the Mackenzie to the s.e. through a level scrubby country till 9:45, when we crossed a large creek from the s., which proved to be the "Comet River" of Leichhardt. The whole bed of the Comet River did not exceed 70 yards, and the smaller channel only 5 to 10 yards wide; and even below its junction the Mackenzie only consisted of a channel 10 to 30 yards wide in the bottom of a bed 150 yards from bank to bank. Just below the junction of the Comet River we found the remains of a camp of Dr. Leichhardt's party on his second expedition. The ashes of the fire were still visible, and a quantity of bones of goats were scattered around. A large tree was marked thus () but a hollow in the ground at the foot of the tree showed that whatever had been deposited had long since been removed; we, however, cleared out the loose earth, but found nothing. The river now turned E.N.E., and our course being E. we receded from it, and at noon ascended a rocky hill of sandstone, covered with scrub. As the country was very scrubby to the E., we turned s. to look for water in a small creek, which proved to be dry, and I therefore steered N. for 1 hour, and reached the bank of the river, and camped in a fine grassy flat, openly timbered with box, flooded gum, and Moreton-Bay-ash. (*Camp cxx.*) Beyond the immediate flats of the river the country was covered with dense scrub of acacia. Near the camp a large flooded gum-tree was marked () ; several years had elapsed since the marks were cut. The day was cloudy, with an easterly breeze; marked a tree near the camp (120 ).

*Nov. 18.*—The morning was cloudy, and rain commenced at 7 and continued till noon; we, however, commenced our journey at 6:25, steering E.; soon entered a dense scrub of acacia, box, sterculia, and Moreton-Bay-ash, &c. Ascending to the level country by a steep slope of sandstone, we continued our course, and, passing a gully with water-holes which appeared permanent, at 11:25 reached a deep creek, at which we camped at 1:40, obtaining water from a small pool in its channel. (*Camp cxxi.*) To the s.e. of the camp, about 5 m. distant, a range of hills rose abruptly from the level country to the height of 800 or 1000 ft.; the summits were flat, and surrounded by high cliffs of red sandstone.

*Nov. 19.*—Resuming our route at 6:30 steered E. through dense scrubs with open patches of grassy forest; the soil a light loam, very sandy in the open forest. Small watercourses trending

to the N. At 10 turned to the s.e. to avoid a large scrubby hill, which lay detached from the principal range, and at 11 turned again E. and ascended a steep sandstone hill, from which the country to the N. and E. appeared extremely level. We then crossed a succession of ironbark ridges, with acacia scrub at intervals, and fine flooded-gum and box flats in the valleys; casuarina and cypress grew on some of the sandy ridges, but the country generally was well grassed. At 3 20 camped at a small pool of water in a shallow watercourse trending N.E. (*Camp cxxii.*)

*Nov. 20.*—At 7 40 steered E. over open country, thinly timbered with box and ironbark. At 10 crossed a dry creek, on the banks of which were recent tracks of horses and cattle. At noon we were overtaken by a heavy thunder shower, and at the same time entered a dense scrub of brigalow and casuarina. At 2 the country was more open, and at 4 10 camped near a small gully with pools of water. (*Camp cxxiii.*) Heavy rain during the night.

*Nov. 21.*—Continuing an E. course, at 6 50 crossed some wooded ridges, from which ranges of hills about 12 m. to the E. were imperfectly seen. Descending from the hills the country was covered with very thick scrub of acacia, and the watercourses trended to the E. and E.N.E. At 11 40 came to the Dawson River, about 80 yards wide, with long shallow pools of water, the scrub coming close to the bank on both sides, leaving a narrow grassy flat. Following the river upwards to the s.e., s., and s.w., till 2 50, camped on the left bank of the river. (*Camp cxxiv.*) The flats increased in breadth as we proceeded, and extended a mile back from the river, were beautifully grassed, and openly timbered with box and flooded gum. The country beyond was covered with acacia scrub. On the bank of the river we observed the tracks of horses, and in the evening a small mob of horses passed our camp, indicating our proximity to a station.

*Nov. 22.*—At 6 15 resumed our route up the river to the s.e., and at 8 came on a dray track, which we followed to the E.N.E. for 2 m., and at 9 10 reached Messrs. Conner and Fitz's station, where we met with a most hospitable reception. (*Messrs. Conner and Fitz's Station, cxxv.*) Having now reached the settled country, and being not likely to require any great quantity of ammunition, which from its weight was very inconvenient for carriage, a general survey of the equipment and stores was held, and those portions of harness, &c., which were unfit for farther service were condemned, and, together with 150 lbs. of shot and balls, were left behind; this reduction of the loads of the pack horses being absolutely necessary, as several of them were lame, and unfit for work. One of the horses, "Pepper-box," had become so

very lame from a wound in the off fore foot, just above the hoof, that I was on the point of abandoning him yesterday when we reached the Dawson, but judging from the tracks of stock that we were near a station, I had him driven on, and succeeded in getting him to Mr. Conner's station, but as he was quite incapable of travelling farther with the party, I sold him to Mr. Conner for the sum of 7*l.*, which I considered to be his full value, and probably more than the horse would have realized at auction could he have been taken to Brisbane.

*Nov. 23, Sunday.*—Remained at Mr. Conner's station.

*Nov. 24.*—Proceeded by the road in a S.E. direction, about 18 m., towards Mr. Hay's station at "Rannes," and camped 1 m. S.W. from "Mount Leith," which I ascended, and took angles to several ranges and hills. (*Camp cxxvi.*) Nearly the whole length of "Expedition Range" was visible, though, from the misty state of the atmosphere, its outlines were not distinct. The country traversed consisted first of level grassy flats, timbered with spotted gum and box, but gradually rose into ironbark ridges well grassed, and a few patches of scrub in some of the valleys. The gullies trended to the S.W. The rocks consisted of a grey micaceous schist, the strata dipping 60° to 80° to the E. Trap veins and ridges were frequent, and formed fine grassy patches where exposed on the surface.

*Nov. 25, Mr. Hay's Station, "Rannes," cxxvii.*—Continued our journey, following the road 5 m. S.S.E. to Mr. Hay's station, "Rannes." The country consists of fine open grassy ridges, timbered with ironbark and box. The water courses trend W. Trap, and slate or schist, constitute the principal rocks, and form by their decomposition a fertile soil. "Rannes" station is on a tributary of the Dawson River, which rises in the ranges to the E. and S. The country to the base of these hills, which are 20 to 30 m. distant, is very level, with large patches of brigalow scrub, and the creeks have very irregular channels with occasional large water holes; but water is generally scarce. At Mr. Hay's I met Mr. Wiseman, the Commissioner of Crown Lands for the Leichhardt district, who informed me that he was not aware of any fixed point in the district with which I could tie in the route of the expedition; but that some of the hills towards Port Curtis had been fixed by Mr. McCabe, the surveyor stationed at Port Curtis, who had also measured some portion of the road from Gladstone; but that it would be requisite to apply to the Surveyor-General's Office for the documents, as he was not furnished with any maps that would be of any service to me. In the evening Mr. Wiseman pointed out to me the hills which were connected with the survey of the road to Gladstone, about 40 m. to the E. of "Rannes," and I decided on proceeding by the road

towards Gladstone till I could connect the route of the party with the surveys at Port Curtis. Besides entertaining the party in a hospitable manner, Mr. Hay furnished us with an order for a supply of meat at his stations on the road.

Nov. 26.—At 9·30 left Mr. Hay's station, and travelling in an average E.N.E. direction by the road towards Gladstone, 24 m., camped at a sheep station. (*Camp cxxviii.*) The country was very level, only one ridge of hills being passed. Small creeks with a few water holes trended to the w. Patches of brigalow scrub separated open, grassy, forest land, timbered with ironbark, box, Moreton Bay ash, and spotted gum. A low hill of porphyry rose from the banks of the creek near our camp.

Nov. 27.—At 6·35 resumed our journey and followed the road in an easterly direction. The country became more undulating, with brigalow scrub to the s., and ironbark ridges to the n. At 8·30 I left the party to follow the road and steered s.e. to a steep hill of porphyry, from which I took bearings to some of the permanent features of the country, and then rejoined the party, and followed the windings of the road through the ranges, frequently crossing a large creek with a dry stony channel and a few pools of water. At 2·30 the road turned to the n.e., and I steered to the s.e., e. and n.e., crossing a high range of hills of granite formation, and descending by steep gullies to the e., camped in a level grassy forest at 4·40. (*Camp cxxix.*) The prevailing rocks on the western slope of the range were porphyry, trap, and schist; but to the e. the slope was very abrupt, and granite prevailed. The country was well grassed and openly timbered with ironbark, &c. At noon it commenced raining, and there were frequent showers during the night.

Nov. 28.—At 6·30 steered south for 1 hour to the foot of a steep rocky hill called "Mount Redshirt," and took some bearings from its southern slope, then e.s.e. 1½ hours, and came to the road from the Burnet district to Gladstone, which we followed in a southerly direction, crossing steep hills and deep gullies till 2·45, when we camped in a small valley with a water hole in the gully. (*Camp cxxx.*) The whole country was well grassed, and timbered with ironbark, box, &c. The rocks granite and trap.

Nov. 29.—At 6·15 resumed our route and followed the road in a southerly direction till 2·30, when we camped on a small gully trending to the s.w. (*Camp cxxxi.*) Two small creeks were crossed during the day, both well supplied with water and flowing to the s.w. The whole country consisted of well grassed ridges, timbered with ironbark and box; the rock porphyry and trap, with a few ridges of sandstone, on which were patches of brigalow scrub, with bottle-trees (*sterculia*).

*Nov. 30, Sunday.*—Remained at the camp. The early part of the day was fine, but clouded over at noon, and commenced raining at sunset, with thunder and lightning.

*December 1.*—Following the road through a more level country, well grassed and openly timbered with ironbark; at 2·30 reached a sheep station belonging to Mr. Berry, of the Burnet district. (*Camp cxxxii.*) The day was clear and cool, with a fine southerly breeze. Obtained half a sheep from the shepherd on the station.

*Dec. 2.*—Continued our route at 7·15 and reached Mr. Berry's station at noon, and at 2·15 camped about 7 m. lower down the creek, which is a tributary of the Burnet. (*Camp cxxxiii.*) Granite is here the prevailing rock, though trap and sandstone exist. The country consists of grassy ironbark ridges, but not equal in quality to the country passed on previous days. Wrote to the Colonial Secretary reporting the arrival of the North Australian Expedition in the settled districts of New South Wales.

*Dec. 3.*—Continued our route at 6·15, and passed the old police station at "Irelan" at noon, and camped at 3·30 1 m. below Mr. Archer's station on the Burnet River. (*Camp cxxxiv.*) Granite, micaceous schist, and variegated sandstone are the principal rocks, fine ironbark ridges resulting from the former rocks; but the sandstone forms low, scrubby, table-topped hills destitute of grass.

*Dec. 4.*—At 6·30 resumed our journey and passed Mr. Cameron's station at noon, and reached Bouverie's station at 3, and encamped on the left bank of the Burnet, there being no grass on the side where the station was. (*Camp cxxxv.*) Forwarded letters to the Colonial Secretary and Captain Wickham, to Gaynduh, by Mr. Cameron's bullock-dray, that town being 20 m. out of the direct line of route. Near our camp the rocks are well exposed in the bank of the Burnet River. The lowest strata consisted of schist, or compact sandstone full of thin quartz veins, and overlaid by schist and thin bedded sandstone, all dipping about 40° to E., and apparently altered by the action of trap rocks, although I did not observe them in actual contact.

*Dec. 5.*—Starting at 7·10 we soon missed the road by following a timber road which led us too much to the right, and I therefore made the bank of the "Boyne," and followed it upwards, encountering much brigalow scrub. At 2 regained the road at Strathdee station, and at 4 camped on the right bank of the Boyne. (*Camp cxxxvi.*) The geological structure of the country is schists, and slates, and sandstone: the former are intersected by numerous thin veins of quartz; the strata appear to dip about 40° to the E., but much disturbed by outbursts of trap which have altered the

djacent rocks. The general character of the country is very similar to that on the middle Burdekin, except that brigalow scrub takes the place of acacia and bottle-tree scrubs. A heavy thunder shower at sunset.

*Dec. 6.*—Started at 7-10 and followed the road till 3, and camped at a small water hole in a watercourse trending to the w. (*Camp cxxxvii.*) The general character of this part of the Burnet district is hilly, with ironbark and grass; but the soil is of inferior quality and coarse grit very frequent; water was abundant, but only in consequence of late showers, as permanent water is very scarce. Granite is the prevailing rock, but veins of porphyry are frequent; fragments of slate and sandstone are numerous in the channels of the creeks. As the rocks all decompose readily, they are seldom exposed on the surface, and the geological features of the country are not well developed.

*Dec. 7, Mr. Lawson's Station.*—Left our camp at about 6-30; and following the road for 2 hours, camped  $\frac{1}{2}$  a m. above Mr. Lawson's. (*Camp cxxxviii.*) At Mr. Lawson's I saw the 'Sydney Morning Herald,' 24th November, in which it was stated that the *Tom Tough* had sailed from the Victoria River on the 22nd July, and reached Coepang on the 25th; that she had been found unfit for the further service of the expedition, and had been sent to Surabaya and sold.

*Dec. 8.*—Travelled for 7 hours by the road towards Mr. Haley's station, and camped on a small gully. (*Camp cxxxix.*) The whole distance travelled was grassy, with ironbark forest, &c. The rocks schist, granite, and trap, forming ridges of moderate elevation.

*Dec. 9, Mr. Haley's Station.*—Followed the road for 9 hours, and reached Mr. Haley's station. (*Camp cxi.*) The country consists of ironbark ridges well grassed, the soil a black or brown loam. Granite, schist, and trap are the prevailing rocks. The scrubs are more frequent, and very dense.

*Dec. 10.*—As the horses required rest and their shoes replacing, &c., I availed myself of Mr. Haley's hospitality, and the party remained at the station. As this delay would afford a good opportunity for Dr. Mueller to examine the Bunya scrubs, he proceeded onwards to Good's Inn for that purpose. Mr. Haley having kindly furnished us with fresh horses, Mr. H. Gregory and myself accompanied him to one of the sheep stations 10 m. to the w., for the purpose of inspecting the performance of a Californian pump erected for the purpose of washing sheep. Heavy rain prevented our return to the head station.

*Dec. 11.*—Returned to Mr. Haley's head station.

*Dec. 12.* (*Good's Inn, cxli.*)—The horses having been shod and the harness repaired, proceeded to Good's Inn, about 18 m. from Mr. Haley's.



*Dec. 13.*—Continued route at 8; passed Mr. Scott's station at 1, and encamped on the head of the Brisbane River at 3. (*Camp CXLII.*) In crossing the watershed between the Burnet and Brisbane Rivers the country became more densely timbered, pine scrubs occupying the higher ridges, ironbark on the lower hills, and spotted gum in the valleys. The soil a red or brown loam well grassed. The valley of the Brisbane is steeper and more broken than that of the Burnet. Trap containing water-worn pebbles, and schistose rocks, form almost all the hills, but the rocks being covered by a considerable thickness of gravel and soil are seldom exposed to view.

*Dec. 14, Sunday.*—Continued route at 6, passed Mr. Balfour's station at 9, Kilroy station at 2, and camped on a large running tributary of the Brisbane River at 3.30. (*Camp CXLIII.*)

*Dec. 15.*—At 5.40 continued route and passed the Darrundal station at 9, and at 2.15 camped 2 m. from a station, the distance from Brisbane being stated by the stockmen to be 39 m. (*Camp CXLIV.*)

*Dec. 16. (Brisbane, CXLV.)*—Started at 5.30 and reached Brisbane at 2. Called on Captain Wickham, the Government Resident. Obtained the use of the police paddock for the night, and sent 27 horses there, keeping 2 in the stable. Not having funds available to meet the contingent expenses of the exploring party in Brisbane, and for the further passage to Sydney, &c., I applied to Captain Wickham for an advance of 100*l.* from public funds in his hands, the amount to be repaid by the commissariat to the Colonial Government in Sydney.

*Dec. 17.*—Received from the Government Resident at Brisbane 100*l.*, being an advance for the service of the North Australian Expedition. Wrote to the Colonial Secretary reporting the arrival of the North Australian Expedition in Brisbane, and requesting authority to sell the horses and other portions of equipment not further required. Sent the 27 horses to Eagle Farm paddock, and kept 2 horses in Brisbane.

*Dec. 18.*—Dr. Mueller desiring to collect some plants which grew in the scrubs near the Glasshouse Mountains, I had 2 horses brought up from Eagle Farm for his use. Arranging stores, &c.

*Dec. 19.*—Dr. Mueller started for the Glasshouse Mountains on a botanical excursion. General duties.

*Dec. 20.*—General duties.

*Dec. 21.*—Sunday.

*Dec. 22.*—General duties.

*Dec. 23.*—Leaving Mr. H. Gregory in Brisbane to complete the arrangements for the sale of the horses and equipment of the expedition, and the payment of the men, I embarked in the

*Yarrow Yarrow* steamer for Sydney, accompanied by Mr. Elsey and Charles Dean.

*Dec. 24.*—On board the *Yarrow Yarrow* for Sydney.

*Dec. 25.*—Arrived in Sydney in the forenoon.

*Dec. 26.*—Waited on the Governor-General, and reported generally on the proceedings of the North Australian Expedition.

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*Report on the Health of the North Australian Expedition.* By J. R. ELSEY, Esq., Surgeon, F.R.G.S.

Sydney, 17th Feb., 1857.

SIR,—I am happy to state that the general sanitary condition of the party has been excellent during the whole period of the Expedition.

No death has occurred, and only one accident that has produced serious results; and these would probably not have happened but for the bad health and impaired constitution of the individual at the time of the accident. With this exception, no one has been rendered unfit for duty by ill-health.

The arrival of the party in the Victoria River, September 1855, occurred at the most unfavourable season, when the heat was very great and the river low. This lasted to the beginning of December, when the rainy season set in.

During this time all our party were more or less troubled with two disorders, both fortunately more disagreeable than serious.

The one arose from a weakened and irritable state of the stomach, causing vomiting immediately after eating, and was accompanied by a painful sense of debility. In some instances it was very obstinate, but usually yielded to quinine, which proved a most valuable medicine. The sickness was not accompanied by diarrhoea.

The other was due to a relaxed state of the vessels of the eye and face. A slight pricking sensation was felt, caused by the sudden dilatation or rupture of the walls of the minute vessels of the eye. This was followed by rapid effusion and swelling of the lids, and in some cases the conjunctival membrane protruded between them. It usually lasted twelve hours, and then subsided as rapidly as it appeared. The lips were sometimes affected in the same way, and in one case the whole forehead was œdematous and remained so for some days.

There were also a few cases of ophthalmia, fortunately of a very mild nature, and not marked by the virulent inflammation which produces such dire effects in the settled districts.

Wounds of all sorts usually healed well. This of course varied somewhat in different individuals, and it was found necessary, where the hands were grazed or bruised, to keep them carefully covered from the direct action of the sun's rays, which was found greatly to retard the healing action, and to produce an irritable condition of the wounds.

There was no case of diarrhoea or dysenteric affection, no rheumatism, nor any injury arising from the very considerable exposure to which we were unavoidably subjected.

During our overland journey one case occurred having somewhat of an intermittent character. It was very irregular in its attacks, and marked by extreme nervous depression. It was caused, I am convinced, solely by overworking at the forge in the full heat of the sun after living for some months on indifferent food, and not by any miasmatic taint. It yielded slowly to quinine.

During this journey we also suffered from slight scorbutic taint, shown by

soreness and tenderness of the gums. One of our number had, in addition to swelling of the gums, several ecchymosed patches on the feet and ankles. The timely use of fresh horseflesh completely removed these symptoms, and produced a strengthening effect upon us all.

Our immunity from disease was doubtless in great measure due, under Providence, to the fact that our party was chiefly composed of young men in good health and of cleanly habits.

I have much pleasure in hearing my testimony to the cleanliness and good order preserved by the men during the whole period, often under disadvantageous circumstances, and to the readiness with which they complied with any suggestion made to them. This especially applies to those of the party who were for nearly 9 months confined to one spot without change of scene, and with little recreation for body or mind.

A painful contrast to the health of our own party was afforded by the crew of the *Tom Tough*, the tender to the Expedition, the majority of whom were men of damaged constitutions. The provisions on board the schooner were, except the bread, of most inferior quality, and deficient in quantity. This indifferent food was doubtless the exciting cause of the diseases from which they suffered, and to which their previous impaired health predisposed them.

The carpenter of the schooner died in April, and, by the end of that month, the whole of the crew except the master, mate, and one seaman, were invalided. On their arrival at Timor, where fresh provisions were procured, they rapidly recovered, with the exception of the man first invalided, whose disease was complicated, and who has since died of dysentery.\*

The climate of North Australia is much more regular than that of the districts hitherto settled in the extra-tropical part of the continent, which can hardly be said to have any fixed seasons. It is remarkable for the absence of that humidity which is so prominent a feature of inter-tropical climates. The effect of this excessive dryness was apparent in the absence of rich and luxuriant vegetation, the small and stunted growth of the trees, the rareness of ferns, mosses, and other cryptogamous plants, and the total absence of lichens, fungi, &c. The scarcity of insect life was also remarkable.

As far as our observations extended, there seem to be three seasons in North-West Australia, viz.: the wet season, commencing about December, and lasting to February; the spring, or cool season, from March to July; and the dry, or hot season, from August to November.

Our first arrival at the Victoria was in September. The whole country was parched, the vegetation dried up, and bush-fires were frequent. The heat of the day was not followed by a cool night. Though the maximum heat was not excessive, rarely exceeding  $114^{\circ}$  Fahr., the minimum was very high, seldom falling below  $80^{\circ}$  at any time, and I have known the thermometer suspended in the air to stand at  $98^{\circ}$  at sunrise. During these months there was hardly any dew. Lightning was constant to the E. and N.E., and was rarely absent for six months. There were occasional thunderstorms during the month of October.

This weather produced an enervating effect on us all, and caused the ailments mentioned above.

The season was certainly more advanced on the coast than inland. Many plants, which were flowering at Point Pearce in September, were found two months later, 100 miles inland, only just springing up.

The rains commenced towards the end of November, and, by the middle of

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\* Mr. Baines informs me that even before their arrival at Timor the men had much improved in health by eating the sub-acid pulp of the fruit of the gouty-stem tree (*Adansonia Gregorii*). It was boiled and mixed with sugar.

December, had fairly set in. On the 18th the freshes had raised the river some 4 or 5 feet. From the 20th to the end of December the rain was incessant, and on the 7th of January the river was 11 feet above its average level. This was the greatest height attained. There were, however, indications of its being a very dry season.

The weather during this time was very oppressive, and the excessive moisture rendered the heat most trying to our party, many of whom were actively employed.

By the end of January the rain had almost entirely ceased, and at the end of February the air had regained its usual dryness.

From March to July there was a constant succession of beautiful weather. The noonday heat seldom exceeded 95°, and was tempered by a delicious S.E. breeze, which blew uninterruptedly for nearly 5 weeks, and, with slight intervals, for 4 months. The days were bright and cloudless, the nights clear and cold, the thermometer generally below 50° at sunrise, sometimes below 40°. This weather had a most beneficial effect on us, and its influence was specially felt by those of the party who were for so long a time resident in camp at one spot, and without any active employment or exercise.

After the end of June, when the party left the Victoria, our movements were so rapid, and the climate so constantly affected by external circumstances, viz. elevation, proximity to the sea-coast, &c., that no general results could be obtained.

We were in the neighbourhood of the Albert River during the same month (August) as both Captain Stokes and Dr. Leichhardt. Our experience was limited, but confirms their report of the excellence of the climate during this (the cool) season; but I should expect that the same cause that produces the mildness in the cool season, would produce a contrary effect during the hot months of the year.

I must refer to the Meteorological Journal kept by me, and now on board the *Messenger*, for a more extended and detailed account of the climate of N. W. Australia.

I have the honour to be, Sir,

Your obedient servant,

J. R. ELSEY, F.R.G.S.,

Surgeon to the N. A. Expedition.

To A. C. Gregory, Esq., Commanding  
N. A. Expedition.

## II.—Notes on the Physical Geography of North-West Australia.

By Mr. JAMES S. WILSON, Geologist to the North Australian Expedition.\*

Communicated by SIR RODERICK I. MURCHISON, President.

Read, May 10, 1858.

PREVIOUSLY to the period of our expedition it was generally believed that North-West Australia possessed a lofty range of mountains, which idea was supported by a statement found in the Journal of Dr. Leichhardt to the effect, that the portion of the great table-land which he crossed, on his way from the head

\* See 'Proceedings,' Royal Geographical Society, p. 210, vol. ii.—Ed.

waters of the Roper River to the sources of the South Alligator, was 3800 feet in elevation. After I had examined the table-land that bounds the valley of the Victoria River, and compared my observations with the notes transmitted to us by Leichhardt, relative to the table-land of the South Alligator, and seeing that the cliff-formed front of that table-land, as described by him, ran in a direction to meet the Newcastle Table-range, I concluded that they were continuous, ranging from 700 to 800 feet above the sea, and that the elevation given in Dr. Leichhardt's Journal was an error of the printer. This I communicated to Sir Roderick Murchison, and it appeared in your 'Proceedings,' vol. i., p. 230, January, 1857. The report given by Mr. Gregory of his subsequent journey from the Victoria River to the Roper confirmed my anticipations.

It is now quite certain that a continuous table-land extends through all North-western Australia, the summit of which runs parallel with the main bearing of the coast, from Melville Island to Roebuck Bay. From evidence that presents itself, I feel satisfied that it extends to the higher land of Western Australia, and that Cape Wessel at the N.E., and Cape Leeuwin at the S.W., are the extreme ends of the dividing ridge, passing between the sea and the interior desert.

The rocks composing this table-land are of the class termed paleozoic, and (with the exception of a few beds of trap and an occasional prominence of granite) belong to the carboniferous era. They may be divided into four series of strata: the uppermost of these is a thick bed of red sandstone in thin strata and generally topped with iron ore in various stages of oxidation. Under this lies a thick compact bed of siliceous sandstone, scarcely showing a trace of stratification, and generally exceeds 100 feet in thickness. It is sometimes (as at Sea Range) divided into two beds, and between the two is a space of about 100 feet, occupied by softer whitish stratified sandstone. These siliceous rocks I consider to be in their order identical with the Sydney sandstone, which in New South Wales overlies the coal-bearing strata of shale. The third rock in the descending order is shale, or clay slate, that decomposes rapidly when exposed to atmospheric influences. It is generally of a bluish colour, but when decomposed forms a reddish clay, which becomes a very productive soil. Under the shale limestone appears: its thickness is unknown. It is frequently covered with a stratum of jasper, varying from a few inches to 60 feet in thickness, and frequently has the appearance of a silicified coral bed.

Though this is the order in which these rocks are placed, they are not all continuous, as for instance, the limestone rock frequently rises to a height which the shale (though higher in the order) does

not reach, and is in such places wanting. The sandstone, however, observes a more even and continuous bed than the lower rocks of the system. This difference arises in consequence of the latter having been deposited on a rather uneven surface of the older rocks, while currents, and the action of the waves combined, rendered the surface that should receive following deposits more even.

As a result apparently arising from this levelling process, these rocks generally blend with each other at their lines of junction, excepting the ferruginous and siliceous sandstone. Thus, the limestone passes by degrees into shale, and the shale into the lower sandstone; but the siliceous and ferruginous sandstone rocks, though laid in close contact, have their line of junction clearly defined.

The general dip of all these rocks is to the N.W., or from the dividing ridge to the sea, so that the top rocks have passed under the sea near to its present margin. The dividing ridge may be reckoned at a mean distance of 300 miles from the coast, and is estimated by Mr. Gregory to be 1600 feet above the sea, which would determine the average slope of the table-land to be little more than 5 feet per mile.

These rocks were deposited by the sea during various periodical submergences; but since that period the sea has, at various elevations (inferior to that under which the rocks were deposited), exerted a degrading influence on the table-land. The ferruginous sandstone being uppermost, and its metallic component being readily oxidized by exposure to the atmosphere, the disintegrated portion was continually removed, first by rains producing streams, and secondly by the action of the waves and currents during each overflow of the sea, the material being drifted to lower levels, where, in deeper water protected from the action of the atmosphere and waves, the rock was partially reproduced in those soft, red, sandstone strata that skirt the north-west coast, and may be considered as belonging to the tertiary period. They are the base of those low plains that, to a great extent, border the sea margin of the table-land. The Plains of Promise are of this formation. So also are most of the islands at the head of the Gulf of Carpentaria, as well as the Coburg Peninsula and the plains along the coast from thence to Point Pearce, extending back from the latter place to the Macadam Range. The same formation has been observed much farther to the s.w. by Captain Stokes, and indeed those vast low plains extending from Roebuck Bay far to the s.w. are a continuation of the same deposits.

This formation yields generally a poor, ferruginous, gravelly surface soil, which has produced an unfavourable opinion of the fertility of the country upon the minds of navigators and others who have visited the coast. It is, however, to a considerable

extent covered with a productive alluvium yielding an abundance of grass, while the timber on the poorer portions of it is superior to that found in the richer valleys farther south.

I have already remarked that the rocks composing the table-land (with the exceptions already stated) are all marine deposits, and during the period of their formation have been frequently and completely submerged. I shall here add, that after the uppermost stratum had been deposited these overflows continued, and are repeated to the present time, but gradually declining in elevation; as for instance, the overflows of the sea during the carboniferous era in Australia exceeded 2000 feet above the present level; those that prevailed during the tertiary period did not exceed 400 feet, and an equally great decline is observable in the deposits of recent date, as for example: in a section of the alluvial banks of the Lower Victoria, raised not more than 6 feet above high-tide mark, I observed nine beds of river deposit, each separated from those above and below by a thin stratum of vegetable mould, containing vegetable remains, thus indicating so many recent submergences. The same process is still going on at lower levels along the present banks of the river.

This declining elevation in the succeeding order of the overflows of the sea produced a gradually denuding influence, wearing away the rocks that had been deposited by the deeper inundations, so that, of the upper or ferruginous sandstone, that was 300 to 400 feet in thickness, vestiges (comparatively) only now remain. When this was removed the compact siliceous rock that lay under, and which now forms the surface of the many flat-topped hills and ranges, protected the softer shale and limestone rocks that lay beneath, and by its dipping to the lowest sea-level presented a hard and impenetrable barrier to the waves, except where intersected by rivers which have furrowed out their courses, both during the periods that intervened between the submergences while that rock was in course of formation, and since that time. The sea at times of submergence entered these ravines, and the waves acting on the then exposed soft under rocks, hollowed out those extensive plains\* that now run parallel with the dividing ridge and the coast, though separated from the latter by detached masses of the table-land presenting cliff-topped ranges on their landward side; such is the character of that plain-like valley of the rivers, Norton Shaw, and Saunders, which is bounded on one side by the Mur-

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\* The denuding process can be observed going on at the present time at the head of nearly every creek tributary to the Victoria, and, indeed, all along the front of the cliff-topped ranges, where water, falling over the face of the hard siliceous rock, or percolating through from underneath it, removes a portion of the soft shaly rock from below, and allows the upper hard rock to break off of its own weight, and to fall over into the gulf below, where, in its broken state, exposed to the weather, it is in time disintegrated and removed by the floods.

chison and Sea or Ellesmere Range, and on the other by the Newcastle Table-range, extending s.w. into open plains, which probably are continuous to those plains seen by Captain King, extending s. from the head of Cambridge Gulf. Of such character also are the jasper plains of the Upper Victoria.

The soil on these plains is a rich clay, frequently very deep, and is derived from the decomposition of the shale rock after being left bare by the removal of the sandstone. The limestone frequently protrudes, and in such localities the soil is more calcareous.

Trap plains occur in the higher part of the table-land. This rock is generally of more recent date than the sandstone, and seems to have flowed over depressions, or hollows, worn out of the latter. It is extensive on Roe Downs, occupying 60 miles from E. to W., and computed by Mr. Gregory to extend over a million acres. The jasper plains contain about 320,000 acres; Beagle Valley, with valleys adjoining, 160,000; and the extensive valley of the Norton Shaw and Saunders rivers it would be difficult fully to estimate, but there appeared under my own observation an extent exceeding 1,500,000 acres, to which if we add the fine country at the head of Sturt Creek and that at the head of the River Fitzmaurice, they will make an aggregate exceeding 5,000,000 of acres. These tracts have come under our united observations, and may all be considered well-watered pasture-land. In addition to these there is an area extending 60 miles in each direction, occupying the seaward slope from the Murchison Range. It has only been seen from the river, and from the summit of the range, and been penetrated only a few miles; but from the slight observations I have been able to make, I consider it to be possessed of a considerable amount of good alluvial land, while nearly the entire district is fit for pasture. To the westward of the Murchison Range grassy plains extended beyond the reach of my telescope, from the highest part of the Newcastle Table-range, and I believe they extend in that direction to Cambridge Gulf.

North-West Australia is in reality a grassy country. In no part of the world have I seen grass grow so luxuriantly, and Mr. H. Gregory observed to me during a journey of ten days, when I accompanied him and his brother to the Upper Victoria, that he had seen more grass land than during all his life before.

Hitherto my remarks have been more particularly directed to that portion of the seaward slope occupied by the valley of the Victoria, which cannot be supposed to claim more than 100 miles lineal extent of the coast; but if we include that which is brought to our knowledge by the research of those other explorers who have laboured in the same field, Captain King up the Liverpool River and Cambridge Gulf, Dr. Leichhardt in the valley of the South Alligator, Captain Stokes up the FitzRoy and Adelaide Rivers, and



Sir G. Grey in the valley of the Glenelg, we may regard the seaward slope of the great table-land as presenting generally similar features at nearly corresponding distances from the coast. Such conditions, carefully considered, will convey some idea of the vast extent of that country suitable for the occupation of a civilized community.

Perhaps on no part of the coast of Australia of equal extent are there so many navigable rivers as on that of the N.W. Commencing with the FitzRoy, Captain Stokes ascended that river with his boats to the distance of 22 miles in a general S.S.W. direction, having then penetrated 90 miles from the coast line. The Glenelg, discovered by Sir G. Grey, is probably an equally important river, but its entrance being still unknown, we are ignorant of the extent of its advantages. Within 50 miles N.E. from the latter, and running a nearly parallel course, the Prince Regent River falls into Brunswick Bay. Cambridge Gulf afforded Captain King an opportunity of penetrating the country there to a distance of 60 miles from the coast line, but he did not explore the river that falls into the head of the gulf. The River Adelaide, explored by Captains Wickham and Stokes in boats to the distance of 90 miles, was reckoned by them to be navigable for vessels of four to five hundred tons for 50 miles, and into fresh water—the South Alligator appears also to be equally navigable.

The Liverpool River was ascended by Captain King in his boat to the distance of 30 miles, being fresh water the greater part of that distance. That the River Victoria is navigable is evident from the fact, that the schooner *Tom Tough*, while under my charge, was brought up to our camp, a distance of 100 miles from Point Pearce, and might have been taken some 8 miles more; but although we succeeded in sailing the schooner up so far, I do not think it safe, in the present state of the river, for sea-going vessels to venture farther up than Blunder Bay.

In the description given of Cambridge Gulf by Captain King, I find that he observed the water to be muddy at the head of the gulf as though brought down by a river, but remaining quite salt. His visit there was during the dry season, when most probably no fresh water flowed into the gulf. Similar phenomena observable in the River Victoria may explain the cause, which I shall describe as it appeared under my own eye in that river. At a place named the Musquito Flats by Captain L. Stokes, a series of shoals composed of fine sand and mud commence, and extend up the river a distance of about 12 miles. We named them the Gourlay Shoals in respect to our sailing-master, who was the first to run a ship on them. At this place the river becomes very broad and shallow. The broad flat sandbanks, at low tide, stand about 2 feet above the water that then occupies the broad shallow channels that wind

amongst them; but at full tide they are covered to a depth of 4 to 7 feet. One of these shoals that I measured was 2700 feet in breadth. During the rainy season the floods bring down the Victoria, and its great western tributary the Norton Shaw, large quantities of mud and sand, and these rivers meeting simultaneously with the tide water at this broad place, cause a temporary inertia during each flow of the tide, when much of the sediment carried down by the floods is deposited on the shoals, and to such an extent, that during the season when we were there some of these shoals increased in height about 2 feet. But when the fresh water ceases to flow the tide ascends the river with greater force, and passing with a bore across the shoals stirs up the sand and mud, a large portion of which is carried down with each ebb. I have observed this muddy water passing round Point Pearce in the direction of Clarence Strait, producing a muddy bottom in that direction, and to this same cause we must assign the origin of those muddy islands and banks, distributed along each side of the estuary of the Victoria, and the annual accumulations will in time confine the water to what is called Queen Channel.

Though the climate of North-West Australia is rather too hot to be comfortable for at least six months of the year, our health was by no means impaired by it, and the months of May, June, and July were really pleasant. The following is the mean or average temperature, obtained from observations taken in the shade, and registered at our camp on the Victoria in lat.  $15^{\circ} 30'$  s., from November 1855, to July 1856, inclusive, for each month, at 6 A.M., 1 P.M. and 6 P.M., to which is added the maximum and minimum of heat, and the number of days on which rain fell during our stay there.

		Mean Temperature at			Max.	Min.	Rainy days.
		6 A.M.	1 P.M.	6 P.M.			
1855	October .. ..	0	0	0	0	0	1
	November .. ..	81.0	100.0	93.0	106	69	12
	December .. ..	79.0	94.0	87.0	105	73	20
1856	January .. ..	78.0	94.5	86.0	104	71	15
	February .. ..	78.3	92.3	86.5	99	75	19
	March .. ..	79.3	96.0	89.5	102	75	8
	April .. ..	75.3	91.2	85.3	98	69	6
	May .. ..	66.6	91.8	84.7	96	60	0
	June .. ..	59.0	84.4	77.5	97	47	3
	July .. ..	59.0	87.0	80.0	97	49	0
		..	..	..	..	..	84

The maximum temperature in the shade shown by this Table is  $106^{\circ}$ , and the minimum  $47^{\circ}$ ; but observations extending through

the night show the average, an hour before sunrise, to be about  $2^{\circ}$  less than at 6 A.M., or when the sun has risen.

From observations registered by Mr. Flood for the months of February, March, and April, at a depôt established by Mr. Gregory on a branch of the Upper Victoria, 90 miles farther s, I obtain the following means:—

	Mean Temperature at			Max.	Min.
	Sunrise.	Noon.	Sunset.		
	○	○	○	○	○
February	72	94·6	86·5	99	68
March ..	72·6	97·8	88·3	101	68
April ..	75·1	90·3	83·6	98	60

In this we see an approximation to the temperature for the same months in the preceding Table, the greatest difference being, that the mornings during February and March were  $6^{\circ}$  colder than at the camp where I was then stationed.

The thermometrical observations for the month of December, 1838, and the following January, by Sir G. Grey, at Hanover Bay, in a nearly corresponding latitude with our camp, approximate very nearly with these Tables. The means that he records are as follows:—

	6 A.M.	9 A.M.	12 M.	3 P.M.	6 P.M.	9 P.M.
	○	○	○	○	○	○
December	82·2	85·3	91·3	90·2	85·8	
January	78·2	84·3	83·1	85·7	80·7	83·4

If we take the mean of these mean temperatures for 6 A.M., 3 P.M., and 6 P.M., and compare them with the mean of the temperatures for 6 A.M., 1 P.M., and 6 P.M. at our camp, I find that the mean temperature for a day at Hanover Bay, in the month of December, 1838, was  $86^{\circ}·7$ , and at our camp for the corresponding month of 1855 was  $87^{\circ}$ ; but the difference for the month of January is much greater, that at Hanover Bay being  $81^{\circ}·5$ , and at the Victoria  $86^{\circ}·2$ , showing a difference of nearly  $5^{\circ}$ . This greater difference in the latter month, I think, is due to the western monsoon, which is at that time of the year set in and blows at Hanover Bay, but hardly reaches the Victoria, where we were encamped. This difference may continue as long as the westerly monsoon prevails. But although the mean of the day is cooler at Hanover Bay, the night seems to be warmer, as the Table represents the mean temperature for 9 P.M. as being higher

than the noonday, noon being 83°·1 Fahr., and 9 p.m. 83°·4. This apparent anomaly may possibly be traced to local causes.

The number of days on which rain fell during the months of December, January, February, and March, at Hanover Bay, is stated by Sir G. Grey to be 44. By referring to the preceding Table for the Victoria, I find that during the corresponding four months the number of days on which rain fell was 62.

I have said that North-West Australia is a grassy country, and this character is due, not only to the great abundance of grass with which it is covered, but also to the luxuriance and variety of the grasses. A few of these, however, are predominant, and in most instances afford excellent pasture. Perhaps the most extensive is a variety that resembles wild oats, and grows to the height of from 3 to 6 feet. This grass acquires its greatest perfection on the stony slopes and at the base of the ranges. It grows in many places on the top of the table-land, and on dry gravelly patches. Bordering this grass, but on better soil, another variety growing close and fine, and not often exceeding 3 feet high, might make excellent hay. This grass covers extensive tracts on the plains, and when ripe it is very difficult to travel through on foot, as it lies, broken by the wind and parted from its roots, in a tangled mass, a foot to eighteen inches deep, and clings round the feet and legs while passing through it.

On a rich alluvial soil occupying a still lower situation than that producing the grass last described, and subject to slight inundations, a gigantic grass is produced which acquires a height of 8 to 12 feet. The extent of country it covers (though considerable in places in the vicinity of the rivers) is small when compared with that of the preceding varieties. Other kinds of grass occupy large areas, of which it is not necessary on this occasion to treat further, than to say that they nearly all afford good pasture. There are also extensive beds of reeds growing along the rivers, of which our horses were exceedingly fond while they remained green.

The timber in the valley of the Victoria, though suitable and sufficiently abundant for the rough structures of a first settlement, cannot be said to be good. It consists principally of eucalypti, but far inferior to trees of the same order in the south. One variety (*melaleuca*), growing along the margin of the rivers or in swamps, with drooping foliage like the willow, would afford good timber to a limited extent. The lower plains along the coast seem to afford the best timber. Mr. G. W. Earl, in his history of the Port Essington Settlement, states that there are tracts of country on the Coburg Peninsula that produce good timber of an Indian character, and names several trees as identical with some that grow in the Eastern Archipelago. And Sir G. Grey represents

the valley of the Glenelg as possessing eucalypti and pine in abundance, and of large proportions.

The indigenous fruits are more numerous, and superior to those of Southern Australia. Among these are three varieties of fig, which are all well flavoured, when they can be found unattacked by ants, which penetrate the fruit and extract all the saccharine juice. There are two varieties of fruit resembling grapes growing in clusters: one is produced by a vine that climbs the trees, and is (I believe) a true grape vine; the other on a plant that requires no support, and dies off annually. The latter is very abundant on the slopes of some of the ranges, and bears a very agreeable fruit resembling in form and flavour a small purple grape. We could get very few of them, as the birds, or other animals, seemed to devour them as fast as they ripened, and the natives also appeared to frequent at that season the localities in which that fruit grew most abundantly. The plants shoot up very rapidly with the early rains, 4 to 6 feet high, and during that time resemble the tender shoots of a grape vine. The ship's cook frequently collected it while in that stage, and used it for puddings in the manner that rhubarb is used in England. The fruit of the *Adansonia*, or gouty stem tree, was used freely by us. The mode of preparation we adopted was to roast the whole fruit in hot embers, then break off the shell and mix the pulp with sugar. After the pulp became dry, when the fruit might be considered fully ripe, we could no longer use it in the way stated. I perceived that it had then acquired a peculiar acid flavour, and the idea occurred to me, that the use of this fruit might be rendered beneficial to the sailors on board the schooner, who from a more constant use of salt provisions than the men of the land party at the camp, and even of a much worse description, were all more or less suffering from the attacks of scurvy, which the best efforts of our surgeon could not arrest. I collected some of this fruit, and taking it aboard to the Captain's wife (who was herself a sufferer), recommended her to have the pulp grated down to a powder and boiled with sugar as a jam. My advice was attended to, more fruit was daily collected, and an agreeable jam made of it for all hands; and I had the satisfaction to observe that all those who were attacked by scurvy only were completely recovered when we left the River Victoria to proceed to Timor. The wood of the *Adansonia*, though very large (measuring frequently 35 feet circumference), is very soft; its fibres are very white and have a silky appearance; they are very readily drawn apart by the fingers, and I judged it a very suitable material for the manufacture of white paper. On several occasions when in want of water, I and my attendants allayed our thirst by chopping a piece of wood from the side of one of these trees, and taking the chips expressed the sap with which the fibres

were completely saturated by chewing the wood, the taste of which was like a sweetish water.

Perhaps the most interesting indigenous production found by us, because affording food for man, and representing the fitness of the soil and climate for its cultivation, was rice. It was found simultaneously by our botanist Dr. Mueller (I believe) at Sturt Creek, and by myself in a swamp by the River "Norton Shaw." I am of opinion that the natives collect the rice for food, as the margin of the swamp was very much trodden by them, and the ears pulled off the plants, leaving only those of inferior description remaining. Of this I am still further convinced by the circumstance that some weeks after this discovery, while I and my party were at breakfast one morning on Sandy Island, we were joined by the old native Deanna with whom we had already formed a little intimacy. Having given him some bread and tea, he enquired by signs what the bread was? In answer I took some seed from a tuft of grass growing by where we sat, and placing it between two stones, rubbed it and showed him the flour; immediately he saw me adopt this operation he expressed his satisfaction as though he understood it perfectly.\*

Wild yams were found by us, and used when such opportunities occurred: they were of course, in their uncultivated state, very small. Along the banks of the Victoria another plant, resembling the potato plant, grew abundantly, having a large root somewhat like a yam, or resembling more particularly that called *tarro* at the Sandwich Islands; it is used for food by the natives. Some roots were dug up by our men while employed in making the ditch round our camp; they cooked and tried to eat some, but found it too acrid. I have no doubt that if it were treated in a manner similar to that adopted with the *tarro* by the Sandwich Islanders, or reduced to the state of a starch, it might be rendered valuable.

A small, but rather pretty tree, producing cotton, was found growing on all the varieties of soil in the valley of the Victoria, but seemed to prefer stony slopes. This tree appears to have a very extended range. It was found by Sir G. Grey at the River Glenelg, and by Dr. Leichhardt along the Gulf of Carpentaria. I saw the same tree growing on the Island of Timor, and was informed there that the cotton was collected to stuff pillows, &c.

The birds and quadrupeds generally are similar to those found in Southern Australia. The Kangaroo and Wallaby were found by us, but they are neither so numerous nor so large there as in the south, while the opossum, if not altogether wanting, is very rare. Being familiar with the habits of this animal in the south, I searched for the scratches which it makes on the bark of the

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\* I presented a small sample of this rice to Sir W. Hooker, at Kew.

gum-trees when climbing, but without success. Several other animals known in the south were not met with here. The native cat was found, and the wild dog was frequently seen, and is a larger and finer looking animal than the dingo of the south. Rats we found both numerous and troublesome. Of birds, the black and the white cockatoos, bronze-winged pigeons of several varieties, and the bustard (or wild turkey of the colonists), were all found in the Valley of the Victoria, but they were all much smaller than their kindred of the south. The laughing jackass (or gigantic king-fisher) is found there also, but like the rest is a degenerate bird. Parrots were rather rare. To balance these deficiencies, however, a kind of rose-coloured cockatoo appeared in the dry season very numerous; there are several varieties of ibis, two or three kinds of ducks, one of them called the whistling duck from its singular shrill note; it and another species are also called wood ducks because they perch in the trees. Geese were sometimes seen, and another waterfowl, nearly as large as the goose, and commonly called a shag, was found at certain seasons in considerable numbers. Many other varieties of waterfowl were got, and some of them very beautiful.

Large bats, nearly as large as the flying fox of Eastern Australia, but grey in colour, were in great numbers, and always found in societies; we had seen them frequently from early in the month of November till April; I judged them to be migratory, from the circumstance of having seen a gathering of them at noon on the second day of the latter month, extending about a mile along one of the reaches of the Victoria, some millions in number, flying in circles overhead; they darkened the air, while multitudes perched on the trees and bushes caused the branches to bend down under their weight. They reminded me of the flights of wild pigeons I had seen in North America. I was under the impression at the time that they had collected there for the purpose of a general migration, but the duty on which I was then engaged would not allow me to wait and observe the direction of their flight. We never saw them again, though we were in that locality for nearly four months after. Some of our people tried this animal as an article of food, and probably it would have been liked had it not been for a musky smell and taste, added to the prejudice existing against it from its having obtained, deservedly or not, the name of vampire. They frequently passed in flights over our camp at night while they remained in that locality, and on such occasions the musky smell attending them was perceptible. I am not certain whether our naturalist enquired into the habits and nature of the food of this animal. My own impression is that it feeds on fruits and berries, especially the grape-like fruit that I have described. The season for these being past might account for their migration.

Sir G. Grey mentions having seen considerable numbers of kangaroos in the Valley of the Glenelg, but mentions also that the country was well wooded with eucalypti and pine, and in this may be discovered the cause why these and other animals are few in the Valley of the Victoria. The difference does not argue in favour of a better soil or more temperate climate; the dissimilarity in the latter, as I have to some little extent shown, is but trifling, but the presence of shady trees in the one place, where these animals can find shelter from the fierce heat of the midday sun, and their comparative absence in the other, will make the district of the Glenelg a favourite haunt, while such tracts as the Valley of the Victoria are avoided. Mr. G. W. Earl mentions that the favourite haunt of the kangaroos in the Coburg Peninsula (which is much nearer to the Equator) is the vicinity of those patches of Indian vegetation to which I have already alluded. Agreeably to these facts, Western Australia, with its sandy soil producing little else than scrub and forest, abounds with kangaroos. This abundance will perhaps be best represented by a little matter of business, told me by a merchant at Adelaide who obtains large quantities of timber from Swan River for the construction of the railways now in progress in South Australia. A dealer offered him one thousand kangaroo skins at 9*d.* each, and he declined the bargain because there was one shilling export duty chargeable on each of them. Another account given me while I was at King George Sound, was to the effect that some of the settlers in Western Australia employ the aborigines in hunting kangaroos for the purpose of exporting their skins, and feeding pigs on their flesh. From these facts it will appear that Western Australia with the poorest description of soil is nevertheless rich in timber and kangaroos.

Fish is plentiful in the Victoria, and several kinds were caught by us. The most plentiful is a variety called cat-fish; it is of a very rich description, but was nevertheless rejected by our people at first in consequence of the cook (a West India negro) having said that it was not considered good in his country. This fish makes a singular trumpeting noise, both while it is in the water and after it has been landed (a circumstance which proves that sound can penetrate water, and also that water will conduct sound). It is armed with a strong sharp spine 2 or 2½ inches in length, that stands perpendicular from the back, and if the fingers get pricked with this it causes a stinging sensation. It would seem that in consideration of its being sluggish and incapable of rapid movements it is compensated with this defence, by which it is rendered a dangerous morsel to its enemy the alligator. Another fish about a foot in length, to which our people gave the name of skip-jack, would, when pursued in the water, take to the surface,



and by a few rapid bounds would cross the river. We never caught one, but a much smaller fish of a similar description we sometimes got by shooting them with bird shot. This variety went in little shoals, with their heads partially above the surface, and seemed to prefer the shallow water about the sandbanks. Bream of a moderate size was easily obtained where the bottom was stony, and was much sought for by our people. A pretty little fish of a yellowish colour, with dark broad streaks across its sides, and in size about that of the common perch, seemed to be a fly-catcher; I have often observed it take its winged prey in what seemed a rather amusing manner. Where the mangrove bushes grow up from beneath the water at the river's edge, this fish takes its position underneath, and when a fly alights on an overhanging leaf, it sends up a little jet of water to the height of 2 or 3 feet directed at the fly, which if struck falls to the surface and is caught. This fish was frequently caught at the side of our ship by a hook and line baited with a cockroach, and on being opened was commonly found to contain a large number of cockroaches; these insects, it appeared, went down outside the ship at night to drink, and were caught by this fish. There was also a large fish which our cook called a jew-fish: it is from 18 inches to 2 feet in length. We could hear them at all hours of the night springing out of the water and falling back on its surface. The only time this fish came under our immediate inspection was on an occasion when one of them leaped into our boat and so got caught. There were many other species of fish in the river, but these mentioned were the most numerous, and, as affording an article of food, are the more important. There is, however, one little fish that in respect to its singularity deserves some notice (if indeed the term fish can properly be applied to an amphibious or air-breathing animal). It is mentioned by Captain Cook and Captain King as having been seen by them on other parts of the north coast. It is about  $2\frac{1}{2}$  inches long, its head is considerably elevated and rather large, the eyes prominent; it uses its front fins as feet in walking on the sand or over rocks, in which endeavour it drags the after part of its body. When it requires to move more quickly it leaps from stone to stone a distance of 2 feet or more, and can bound across the surface of the water in the same way. We never found it in such parts of the river as are occasionally fresh.

The natives of the Valley of the Victoria are not numerous, the cause of which may be traced to that already stated as affecting the distribution of animals in Australia. They are easily identified with the aborigines of the south, and differ physically only in being generally slighter and the hair more crisp. Their colour is a brownish black, their hair crisp and black but not glossy, and in this respect they resemble some natives of the interior of Timor that

I had seen at Coepang; they have less beard than the men of the south, but of that little they seem to be exceedingly proud; they ornament it by fixing kangaroo teeth to the extremities, and on one occasion I saw a young man with the tip of a kangaroo's tail gummed on to his beard to increase its length. The men of some of the tribes have two of the upper front teeth broken out, and this gave some of the old men a rather singular appearance, as it seemed that the teeth on each side of this breach wore away, and allowed the lower front teeth to pass considerably up into the vacant space. Other tribes (who do not remove the front teeth) grind the top edge off all their teeth so as to bring them to an even surface line. A Jewish rite, that has been observed to prevail amongst the natives of other parts of Australia, is practised by all these tribes; they likewise mark themselves with large raised scars across the chest; they wear no clothing save a belt of cord made of animal hair drawn twenty or thirty times round the body and the two ends secured; this the native slackens when he has got plenty to eat, and draws it tighter as he feels hunger pinch him. On one occasion I saw two young men, who had each a bunch of long feathers suspended from his belt by way of an apron; and at a camping place that seemed to be selected for the wet season, I found beds made of bark, and what I supposed to be a kind of cape. It was made of long grass fastened by the end to a band which they could pass round the neck, and then, when in a sitting posture, would have the appearance of being in an envelope of thatch. We found no huts at their camps, and the only shelter they appeared to construct was to lay some sticks across from the branches of one bush to those of another, and lay some green boughs on top, to which they sometimes added grass to shade them from the sun. On the tops of detached conical hills we sometimes found structures of loose stones rudely built in a circle, but open on one side, generally to the n.w. or dry weather quarter; they were built about 3 feet wide and  $2\frac{1}{2}$  feet high; across the top of this wall were laid some dry sticks, which were again covered with a little dry grass. From their being found in such exposed situations and large enough only for a man to sit in cross legged, I judged them to be look-out stations where the natives watched for the kangaroos' coming to favourite spots below.

In April and May, when the grass becomes dry, they burn it off about such water-holes and creeks as the kangaroos frequent; when the grass is thus early burned, the roots being still moist send up a second crop, and this is so sudden that I have seen green grass the third day after the dry was burned. This is done by the native to induce the kangaroos to come to such spots to feed, and be the more convenient for him to hunt.

Their weapons are only spears, and these are of three kinds;

one is a small spear about the length of an arrow, about 3 feet in length, sometimes of wood, pointed, at other times of reed, to which is fixed a long point of wood; these are used for killing birds. The second is a spear about 9 feet long, having a point sometimes neatly made of jasper or siliceous sandstone; these are used for the chase and the fight. The third description of spear is used for taking fish, and they are either barbed or forked, the former for taking large fish by being driven through them, and the latter for taking fish of smaller size by fixing them within the fork; the points of the fork are left blunt and smoothly rounded to prevent their piercing the fish.

The natives on the mainland of Northern Australia have no boats or canoes, the only thing of the sort observed there being a bark canoe, seen by Captain Stokes in the River Adelaide; but on some of the islands fronting the coast they use rude boats hewn from solid logs, across which they fix out-riggers projecting 7 or 8 feet from each side, to the extremities of which are fixed long floats of some light wood parallel with the boat, which prevents the possibility of its being turned over. Up the River Victoria the natives used floats to enable them to cross the river. These floats are composed of one, two, or three stems, according to their size, of a peculiar kind of mangrove tree, that is, when dead or dry, very light and buoyant. The native, after crossing the river on one of these floats, leaves it in a position or place out of reach of the tide, and convenient for the next who may require it. They use these floats in places where they could readily swim across without them, on which occasions I think the float is used as a protection against the attacks of alligators. When I have seen a native cross the river alone, he got apparently astride on his float, having the small end of the log passing down beneath him, and the forward or thick end above water; but when a number cross, as I once saw a tribe (including the women and children) do, they took the float under the left arm. Only once did I see the natives cross without floats, but then they were in some number, which seems to be sufficient security against the cowardly reptile.

In the Gulf of Carpentaria the natives pass from island to island on rafts made of the dead stems of mangrove packed into a kind of flat bundle 6 to 8 feet long,  $2\frac{1}{2}$  feet wide, and 1 foot deep. We discovered three of these rafts on Sweers Island that the natives, apparently only a few hours before, had drawn up on the beach. In other parts of Australia the natives are known to propel their rafts or bark canoes with a spear or with their hands; but here we were astonished to find well-formed paddles with each raft: on an inspection, however, I found that these paddles, though 6 inches broad, and on an average half an inch thick, had grown nearly in the form in which we found them. I took one of





these paddles from a raft that had got two of them, and left a silk handkerchief and a bottle in exchange; it is now deposited in the British Museum. Mr. Flood afterwards found the tree from which such paddles are made to be a variety of mangrove growing on the margin of the Albert, having four roots striking out from the stem above ground like four edges or blades radiating from a centre, but continuing parallel with and united to the stem for more than a foot before parting; two of these edges on opposite sides being removed and the other two retained leaves the stem of the little tree in the form of a paddle.

Though the natives of some of the islands along the coast have boats which they hew out of solid logs, and construct them in a manner that enables them to go to considerable distances, I do not think it argues a greater degree of ingenuity for them, but rather that their islands produce more suitable timber for that purpose than does the mainland, and the necessity that impels them to seek their supplies of food in the sea induces the attempt at boat-building.

Having been stationed for a considerable time at the River Victoria I had more frequent intercourse with the natives than any of the other officers of the Expedition, and I am happy to say that, except on one occasion, our intercourse with them was always amicable, and that, on the Lower Victoria at least, there is no impression left on the minds of the native population unfavourable to their English visitors.

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### III. — *Journey from Colesberg to Steinkopf* in 1854-5. By ROBERT MOFFAT, Esq., F.R.G.S., Government Surveyor at the Cape.

Communicated by the COLONIAL OFFICE.

*Recd.*, December 14, 1857.

THE following is a narrative of a circuitous journey of about 750 miles from near Colesberg to Steinkopf, in Little Namaqualand, during the months of December, 1854, and January, February, April, and May, 1855, by which I traversed the east, south, and west sides of the tract of territory annexed to the colony by proclamation of 1847. My route lay, on an average, about 20 miles beyond the surveyed lands, or rather the old boundary, which I occasionally touched, leaving to the left the Karree, Hantam, and Langeberg table ranges, and to the right an extensive champaign country, with a few migratory Boers and Bastards adjacent to the road, and towards the north the Bushman horde.

My object in writing this journal is to show, in conjunction with the map, the circumstances under which my examination of the

region was made, what I saw, and the degree of confidence which may be placed in any suggestions I shall presume to make in subsequent communications.

In the month of November, 1854, I entered into an engagement with the Directors of a Copper Mining Company to proceed to Little Namaqualand as their managing agent and surveyor, for a term of two years. The route thither was left to my option. Having a desire to examine the mountainous country of the Orange River, immediately above Pella, and the waterfall, on my way, as I had heard of metallic indications there, and to be acquainted with the country bordering the east of Little Namaqualand, as far as it might be adapted for the supply of stock to the mines, I concluded on going overland and traversing the left bank of the river. I was anxious, at the same time, to gratify my love of travelling through unfrequented parts, and moreover inquisitive regarding the immense tract of unoccupied ground, of which very little appeared to be known by even the authorities, especially as some very important arrangements were about to be made for the future disposal of crown lands.

I accordingly left Colesberg on the 6th December for the Orange River, and directed my course towards the "Little Bend" (as it is called in the maps), bearing about north-west. Mr. Charles S. Orpen, of Colesberg, having kindly given me a general sketch of the parts about Hopetown, I avoided that round.

As the lung-sickness was prevailing, I hired oxen as far as Jackal Font, near Rhinoster Berg, the residence of Field-Cornet Jan Dupree, and the first place shown on my map. The Civil Commissioner of Colesberg had been so kind as to give me a letter of introduction to Dupree, and I arrived at his farm on the 10th of December. Here I was detained by heavy rains and the non-arrival of oxen till the 15th, when Dupree moved my waggons with his span of horses as far as Roodkuil, where I purchased a span of twelve, partly untrained. On the 17th I found that two of my servants, whom I had sent to sleep at the kraal to prevent the escape of the oxen at night, had decamped. Hearing that the worthy Field-Cornet had, during our stay at his place, terrified them with his account of the Bushmen along the Orange River, I thought it of no use to pursue them, and committed them in a note to the tender mercy of the magistrate at Colesberg. I was thus left alone with a driver and an English lad, and it would have been vain for me to search for other servants in that neighbourhood.

Having no time to lose, I started on the 18th, taking the whip myself and turning my driver into leader. Through the usual mishaps of South-African travelling—such as sticking fast, oxen bolting, breakages—I did not reach Honig Kraal, the lower ex-

tremity of Beer Vley, till the 26th. We passed numerous Boers, some on isolated farms, which had been surveyed as requested, others on vacant lands about the Pans. All seemed pleased at the new arrangements proposed by the Committee for the future subdivision of crown lands, and as they found I was a surveyor, made many inquiries.

At Honig Kraal, where we were without the old boundary, lived an old man, named Abram De Villiers, who fought at the taking of the Cape. I found him very intelligent, and he was able to give me a smattering of information regarding the country I was about to traverse, and the Bushmen, whom he considered a dangerous people. I had been referred by most of the farmers to him for an account of the route; but most of what he told me was from hearsay among the Bastards with whom he had traded.

On the 29th I crossed the channel of Brak River, just where it leaves the Vley, and arrived at Great Brak River (otherwise called the Ongar River). Here I saw several Bush children, who had been taken by Hendrikse, the proprietor of the place, in the last foray against their wild parents in the Doornbergen. On the 31st we reached Doornberg Fontein by a very circuitous road. This is the outermost farm, in the occupation of a white person. He, one Neethling, had been in possession of it for several years, even for some time before 1847. The fountain, which is in calcareous tufa, has great capabilities; at times it is thermal. Neethling I found could give me no information of the route; he, however, gave me two or three interesting facts regarding the perceptible changes which were taking place in the face of the country about Brak River, by periodical denudation. I began to be surprised that so little was known of the country to the west, so long after its annexation. Procuring the services of one of the Bastards, several of whom I found here, and who appeared to set up as great a claim to the locality as the farmer, I skirted the eastern base of the Doornberg range, as far as Brieschap on the Orange River, at the Little Bend; crossed several times the bed of a channel, with here and there at short intervals pools of rain-water, surrounded with fine grass. There were also several eligible spots for dams, and we saw a few Bastard hamlets. I observed numerous springboks trekking to the south, among which was one perfectly white, which I attempted in vain to shoot. I was told that such were occasionally to be seen, and were generally considered by the Bastards as the precursors of unusually large herds.

At Brieschap, instead of finding a considerable village, as I had anticipated, I saw only three or four semispherical huts, and one or two wattle and daub houses—one of the latter occupied by an “apprentice Jong” from the Cape, and the other by a respectable old Bastard, named Benkes. I was informed that the usual resi-



dents were out with their cattle at the pans and vleys, so as to reserve these pastures for the winter season. The two above mentioned were engaged in cultivating gardens and digging a large watercourse. They were, however, evidently under the impression that the place would be granted to Boers, and stated their hope of lands being allotted to them, and their readiness to pay the cost of a title-deed and survey. A fine young man, the son of the Bastard wife by a Boer, her first husband, seemed worthy of a better lot, and appeared by no means indolent. I remained here three days seeking servants and guides; but all betrayed fears of the Bushmen infesting the mountains to the west. On my sending out the above young man to the pans and vleys for the same purpose, he returned with the laconic reply that men were too fond of their lives, however well paid. On the fourth day a wily-looking Kafir, named "Old Piet," from Schietfontein Missionary Institution, some way to the south, passing the waggon, I inquired of him, and he immediately offered me his two sons and an Oerlam Bushman to accompany me part of the way. He proposed that they might guide me as far as a point at which the De Wit range (Hartzog Berg of the farmer Villiers) crosses the river, where they might make arrangements with the Koranna chief, "Jan," on the opposite bank, to cross and convey me through the Bushman Horde, as far as the junction of Hartebeest River, and that the Koranna chief on the opposite bank there would, no doubt, give me a small escort as far as Pella, for the Bushmen and Korannas were on good terms. On meeting with a Koranna chief from Delvits, some time after, in Namaqualand, he informed me that the greatest enmity existed between them. As Kafirs were, according to the report of the Bastard, a terror to the Bushmen, and the two sons of old Piet were intimate with the Korannas, it was considered by all a favourable opportunity, especially as the Bushman who was to accompany us showed himself remarkably agile in his movements, and Oerlam in his readiness and tact at inspanning; and arrangements were accordingly made to our mutual satisfaction.

On Monday, January 8, we continued our journey—travelling in a westerly direction and keeping the river in view most of the way—to our right. Crossing several rugged channels and passing a picturesque gorge in the range to our left, we outspanned at a small and shallow vley among the hills. Next morning, crossing a dry channel, the upper part of Buys Vley, we ascended the main range of the Doornberg, which here approaches the river, and is continued beyond. The road was rough and injurious to the oxen. We then descended the opposite side, through a long winding defile between red cliffs, presenting a very sombre appearance amid the solitude of the place. On emerging from it we crossed once or twice a dry channel, which contained abundance of grass,

waving most luxuriantly ; a small spring lay at the head, called Paarde Fontein. Keeping the bed of the channel we reached Kalk Fontein, a brack spring in the bed of Kat River, the banks of which are composed almost entirely of calcareous tufa. It appeared to be a Bastard lay place, or werf, of considerable importance. I observed only two small gardens, with a few melons and pumpkins, and some way off a hartebeest hut, but no tenant. A high mountain to the north-west presented a very bold front.

On the 10th of January we rode on for a short distance in a northerly direction, crossing the channel twice. At the lower ford we saw a few huts of a Bushman, named "Thogo," the father-in-law of the one who accompanied me. The "skerms," or screens (small enclosure of dry bushes), found on all lay places of the natives, were numerous here ; and I was informed that there were several fountains in the neighbourhood, among the conical hills of blue limestone. We then travelled along one of the sharpest roads I ever had the misfortune to find, crossing gullies and spruits, and occasionally into and out of the river channel, keeping this to the right and the high mountain to our left. We outspanned at a ford, impassable at this season, opposite a hamlet, called "Bull Fontein," on the other bank in Waterboer's territory. This place had a very civilized appearance, all the houses being of a square and neat construction. It is the residence of several families of the Beukes and Van Wyks, some of whom occasionally reside in Namaqualand. Not a living being, however, was to be seen ; but we were aware that the residents were along the river some miles below. I fired a shot, thinking to arouse some individual in charge of the premises, and to cull further information ; but there was no reply. We then rode along the wide and soft bank of the river, among trees and bushes of all kinds, and bivouacked for the night under an immense mimosa. From the Bushman "Thogo" we had heard of the depredations of a few of his wild countrymen, one of the latter having a few days before killed with an arrow the herdsman of the Beukes family as he sat at the fire. He spoke of two others, still at large in the immediate neighbourhood, one of them provided with a gun. Hitherto we had been in the habit of allowing our oxen to graze all night ; but such reports, however doubtful, led us to keep them fastened, especially as I had been informed by others that the 'Nougat Pan, a little in advance of us, was the limit of safety along the river.

Next morning, the 11th, we skirted the same high range, keeping the right bank of 'Nougat Spruit, which empties itself into the river a little below Bull Fontein. Along this spruit we observed numerous *skerms*, lately occupied by migratory Bastards and Kafirs, and a few blocks of willow wood, which I afterwards found had been prepared for the Victoria market. At the first fountain

in the channel, the short but bad road to Riet Fontein along the river, deviated to our right. Keeping the spruit, we entered the pass or gorge through which it descends, scooped through calcareous tufa, as usual in these parts. This gorge presents a very imposing appearance, as one gazes on the precipitous red cliffs; the winding talus under the krantzies on either side was studded with fine specimens of the *kokerboom* (*aloe dichotoma*), of which the Bushman makes his quiver. I have observed that this aloe is peculiar to the metamorphic rocks. A few baboons, with their hoarse chattering, made us aware that we were not quite alone, and now and then a startled *rhebok*, or *duiker*. We saw no gemsboks, which were reported to be numerous here. Occasionally could be observed fragile ladders, made by the Bastards, pendent from the fissures and caves containing honey-nests, of which there were said to be thousands. At the uppermost fountain we filled our *vatjes*, and allowed the oxen to drink, intending to reach Riet Fontein, the lowest Bastard lay place along the river, before nightfall.

On emerging from the gorge we observed a road deviating to the left, towards Wittewater and Kalk Fontein, the latter more direct than that which we had come, and passing a place called Houwater; but the heat being intense, we were compelled to span out a mile or two beyond. After passing, I found that about 500 yards to the east of the junction of these roads, and at the head of a ravine, was a large cavern in the precipice of argillaceous rock, called '*Nougat*', from which the pass takes its name, in which the Bushmen and Bastards excavate the ochreous substance, called by them '*nou*', which they use as a pigment for their cheeks. This is identical with the *sebilo* of the Bechuanas, found in the same rocks to the north. The stone, when broken, presents a bluish-grey fracture, studded with shining particles, and is, I believe, massive hæmatite iron ore, yielding a cherry-red mark when cut or filed. The natives pound this substance and mix it with fat to apply it. It is often, they say, found in a red powdery state in similar caves. In the absence of this pigment they use a plant, called *haas bugu*, and another, *wolf bugu*, a fungus with a pod containing a dark powder, usually found growing on ant-heaps. They are averse to relinquish the dirty custom, urging that they have no other means of cooling their faces. I had not the pleasure of visiting the above cave.

Ever after leaving Brieschap our Bushman guide had been complaining of sore eyes, and the usual means of relieving them were of no avail. To-day he complained still more. While outspanned we all prepared our guns, and I divided fifteen charges and bullets among the three, who then seemed to be perfectly satisfied. On spanning in again I observed they had omitted to lash their guns in the waggon. Seeing the two Kafirs busy assisting the driver,

I thought it might still be their intention to do so ; but Theus, the Bushman, proceeded to inform me that some disagreement existed between him and them—that his eyes were so bad it would not do for him to go on with us, and he had requested them to conduct us farther. I remonstrated with him, but to no purpose, and immediately suspected their motives. Calling the Kafirs, I promptly demanded whether they were of intention to remain with me in the event of Theus turning back, and received a decisive reply in the negative. Without a moment's hesitation I ordered their horns and tassels to be emptied of powder and bullets, and satisfied myself that their guns were not loaded. They seemed quite taken aback and inclined to repent of their unfaithful behaviour ; but as my confidence in them was lost, I had no more to say to them.

My driver and I, rather disconcerted by their cool villany—for their wages had been advanced—immediately consulted as to our movements. He did not feel disposed to prosecute the journey along the river, as no Bastards were near of whom we could ask assistance. For my part I must confess I felt rather unnerved with such faithless scoundrels in our rear, who knew our limited means of defence, however dangerous the Bushmen in advance might be, and therefore gave the signal for a retrograde movement. I really felt sadly chagrined and disappointed ; but as the beaten path along the river terminated a little beyond Riet Fontein, I did not consider myself justified in going even as far as that place, only four miles distant, to gratify curiosity, after meeting with such obstacles which might be increased, and having lost so much time, to the detriment of my employers. Had I not been in a responsible situation, and so unprovided with ammunition, I should have been inclined to grope as far as the Delvits hills, which I particularly wished to examine.

We concluded our best plan would be to return to Kalk Fontein by the same road, and go from thence in a south-easterly direction to Jackal Water, and thence, as guided by the Bastards, south-westward, so as to keep the line of the outermost squatters at the various pools and vleys. I afterwards had no occasion to regret this plan, for I found myself in a new and interesting field of research, though one not so exciting as that which we were now sorry to leave.

Seeing that we returned by the same road to Kalk Fontein, instead of going more directly to Wittewater, the renegades accompanied us. On nearing the lower fountain of 'Nougat Spruit, where the road deviated towards the lower ford of the river, Theus insisted that the Beukeses and Van Wyks were squatted there, and that they would gladly help me across with the waggon. It occurred to us that these fellows seemed particularly anxious to detain us in the neighbourhood, where not a soul but old Thogo

and his concomitants was to be seen for many miles. I, however, mounted my old hack and rode in advance to the lower drift, but, to my disappointment, could not observe a living object on the opposite bank nor the smallest cloud of dust indicative of the movements of sheep or cattle hieing homewards, for it was the usual hour; while the waters glided slowly along their ancient channel, only increasing my impatience to be speeding towards the country which they would reach long before me in spite of all my efforts. Had the river been passable, I should doubtless have forded it so as to get into the great trek-road of the Bastards,\* along the n. bank among the Korannas, for it is only on the s. side within the colony that the Bushmen are dreaded.

I returned to the waggon at the lower fountain, where we outspanned for the night. The three then took their guns and moved eastward towards Thogo's kraal, distant about 10 or 12 m. I did not heed them, but observed my driver remonstrating with them as to their being answerable for any evil which might befall us from skulking Bushmen, and that they remained. Were our journey between Brieschap and Riet Fontein made in the winter we should have had more cheerful days, and perhaps never thought of the unsafety of the locality at other times; but our solitariness made everything appear desolate. On this occasion the scene at nightfall, with its associations, was one of impressive sublimity: above, the sky was covered with irregular masses of black clouds, which emitted occasional flashes of lightning, followed by rumbling thunder. On the one side was the sombre gorge of 'Nougat, with its red precipices and furrowed mountains, beyond which lay an immense waste, infested with straggling Bushmen: on the other, the "wild resounding river," fringed with dense and dark mimosas: in the mid-distance a chaotic region of hills, and beyond them again lay a far more expansive waste—the Kalahare wilderness. But these feelings were marred by those of disappointment at our retrograde movement, and disgust at the conduct of our guides.

Next day, the 12th, we passed Thogo's kraal, where the three guides quietly took their guns and retired. Arrived at Kalk Fontein at nightfall: here we found ourselves again perfectly alone, at least 25 m. from any Bastard homestead, and very low-spirited to find that by going so far as 'Nougat we had only injured our oxen, which commenced to limp from the sharpness of the roads. I could not have conceived that the obstacles along this route were so insurmountable. The fear of Bushmen beyond 'Nougat seemed to possess all the natives. The ignorance of the Boers, on the borders of Colesberg District, of these parts is very surprising, and the few who have been out on Bushman com-

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\* Between Griqualand and Namaqualand.

mandos are little better informed. Mr. C. S. Orpen, whom I saw at Colcsberg, was the only one who had given me any knowledge of these parts, which he had himself traversed as far as Riet Fontein. This gentleman is remarkably well acquainted with the Hopetown neighbourhood, and apparently much respected there.

On Saturday, the 13th, we travelled to Jackal Water, keeping s. over a wrinkled surface of indurated limestone, very injurious to the hoofs of the oxen, till we passed Dik Klip Poort range, branching from Doornberg. We then had an open undulating country to travel over. The valleys of red soil all the way were waving with fine sweet grass in immense quantities, but too far from fountains and pools to be conveniently available in a region neighbouring Bushmen. At Jackal Water, for the first time since leaving Brieschap, we met with Bastards. We found five or six huts and as many waggons. One of the Bastards seemed comparatively wealthy, and the rest hungry relatives and attendants. We were now among some of the people who were "too fond of their lives," and who naturally congratulated us on our retrograde movement. I was amused to hear that our late companion, Theus the Bushman, was the son of the notorious one who, some years ago, murdered the farmer, Nell, in the Roggeveld, and that he once, near Riet Fontein, placed a Dutch farmer in even greater difficulties than those from which we had extricated ourselves, in which the latter nearly lost his life: we were, of course, thankful at having escaped his treachery. The water at this place was very filthy, being in stagnant pools in a large gully between quartzite rocks. There was, however, a small spring of clear water in a fissure near our waggon.

While here, I made inquiries about a direct road to Namaqualand. One, the most direct, was said to extend to Vries Kolk, thence to Stinkbrak, through Hartzog Kloof, and past the Great Salt Pan; but everyone deprecated it as unsafe from Bushmen, five having been seen on the first portion of the road a day or two before, and not a soul would be induced by the most tempting offers to accompany me along it. Another road, they said, I should enter, by travelling in a south-easterly direction to Jonkerwater, and this I chose, two men having consented to act as guides for some distance beyond that place. I here made up my mind to cull all the information I could on my route regarding this comparatively unoccupied country; for though I could not but regard the late Report of the Committee on Crown Lands as an admirable production, evidencing sound acquaintance on the part of those who drew it up with the detached portions of crown lands within the boundaries of the outer districts, I supposed that the non-mention of this region, which is at least two-thirds the size

of the Orange Free State, and within the new colonial boundary, arose from the utter absence of information regarding it.

On Monday, the 15th, we continued our journey, keeping for several miles abreast of a ridge of low quartzite hills, giving our cattle water at a pan, which had been filled perhaps by a passing shower. We rode on and encamped at a similar one, but containing, instead of water, which had dried up, abundance of excellent grass, though not a blade was to be seen among the stunted karroo shrubs around. Next day, passing herds of springboks, of which we shot several, we arrived at Jonkerwater, a brack fountain and saltpan, situate on the great high road from the Cape to the interior. The nearest Boer was about 30 m. to the s.e. of us, viz., the Field Cornet Vander Westhuizen. The saltpan was about 300 yards wide: the annual yield of salt I heard was 15 or 16 muids, of which the value was about as many pounds sterling. Two Bastards\* appeared to be doing their best to cultivate the place, and seemed anxious for information regarding the future disposal of crown lands, as they had fears of the Boers claiming this or applying for it.

We had thus, after travelling six weeks, only gone over one-third of the whole distance of our destination. On the 17th we rode on, bearing generally s.w., passing over low table-lands with numerous pans and thousands of springboks. Observed to the right a fine large and meadow-like grass vley, with a deep bed; the outlet was at a narrow gorge, on a basaltic ridge, crossing the lower end, which, if closed, would transform it after rains into a small lake. We halted at nightfall at a lonely spot, and next morning, crossing a small range of sandstone hills, we spanned out at Grant Pan; to our right lay at some distance Gudenskop, at the base of which was said to pass the other direct road to Vries Kolk, which place we could see to the westward. I was informed one Witboy, a Bastard, resided there. Then, descending a long plain, and crossing a few floors, as they are called, we reached Mark Vley. We found no one here; but it appeared to be a lay-place of some importance, as there were numerous "skerns," and it has evidently great capabilities. Skirting the left bank, in the evening we outspanned at the upper extremity of it. The whole presented a fine sheet of water, covering about 2 square m., unusual rains having fallen: hundreds of wild ducks sported on the surface. On the 19th we crossed another very extensive plain. Our path was intersected here by the great track-road, from the Colesberg district to the Olifant Vley pastures to the w. Gently ascending a range of high land, we arrived at Tomas Pan on the top. This was a fine and deep pool without any outlet, but it con-

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\* Roedolph van Wyk and another.

tained abundance of water. Here we found, under the charge of the herdsman, a large flock of sheep, belonging to some colonial trader in the neighbourhood of Schiet Fontein. In the afternoon we took a route more directly w., leaving Schiet Fontein Missionary Institution about 40 m. to the s. Arriving at Ganna Pan, a shallow water, where were a few Bastards and a Swede named Petersen, with one eye, who was reported to be well acquainted with the country, I determined on making an effort to engage him as a guide the whole way. I found that all the waters in this neighbourhood were frequented at the time. There seemed to be great uncertainty as to the most direct road to Little Namaqualand, as they remarked I was the first traveller who had attempted the whole distance. I found afterwards that the springs, kolks, pans, vleys, &c., were so numerous and precarious in yield of water that the country along my route was actually reticulated with half-beaten paths, so that their inability to suggest the most direct line was not to be wondered at. The dread of a few straggling Bushmen seemed to be felt even here. I could only attribute it to the lack of ammunition; this I found very scarce. The Bastards unanimously stated that the road by way of Hartzog Kloof and the Great Salt Pan was still considered very unsafe, unless we had a stronger party, more horses, and abundance of ammunition, as no people were to be found at the intervening waters, and only one or two parties were at the kloof above mentioned. Petersen, whom I engaged, proposed a circuitous route to the southward, so as to touch at the outer Dutch farms along the Karree and Hantam Bergen. I suspected he knew this to be the more convenient for himself, as well as the safest; but I objected to the rough hilly roads, from which my oxen would suffer, especially as they had greatly improved during the preceding few days on the low soily country; and, moreover, I wished to see the less frequented parts. I determined on keeping to the right of the hills, which was the middle route and more direct withal. I had afterwards no occasion to repent this, for my ten oxen brought me safely to Springbok in Little Namaqualand, to the astonishment of many persons as well as my own. I was also enabled to judge for myself of the capabilities of Bushmanland, by having kept within its borders.

On Monday, the 22nd, we trekked as far as Boozak Kolk; day exceedingly hot. Here our path was intersected by another great trek-road from the Beaufort district to the Olifant Vley pastures.

Next day we reached Dwaal Berg Kolk, the large hill to our right, so called from the circumstance of an unfortunate having once lost himself for two or three days in its recesses.

Next morning, the 24th, our new guide, Petersen, joined us here, and the two Bastards left. We travelled as far as Krom Vley, passing a fine large conical hill to our right, called Franzes



Kop; after an old trader, who, some years ago, endured the agony of spending four or five days on the top, in fear of Bushmen and lions, till rescued by a passing "trek." Some distance to our left stood two large hills abrcast, called Jagersberg, forming the N.E. end of the Karreberg. At Krom Vley, I found a boer, named Stenkamp, from whom we gained a little information as to our road. This worthy had a Bastard wife and some dependants. He lived with her and his children in a semispherical hut in real nomadic style. I was surprised to hear them address him Bas (master). One well-built lad, with an European complexion and physiognomy, especially attracted my attention. I could not but think such were worthy of a better lot than that in store for them, and which will, as usual, arise, from their precarious and unfortunate origin. In a letter I had had the pleasure of receiving from my brother-in-law, Dr. Livingstone, date Golungo Alto, 21st May, 1854, he writes of the Portuguese there:—"Their children can all read and write, for unlike the Dutch farmers, they never disown their children by native women: they, the mulattoes, are something like the Griquas in appearance." I could not help thinking that a traveller would have a very different tale to tell of their poor analogues in this British colony. I was informed of some twenty or more Europeans along this border who were similarly circumstanced.

On the 25th, passing Karn Melk Kolk, an extensive floor, we reached Visters Kloof, the only point at which we touched the Great Karreberg Range. Here I found some Bastards, with 2000 or 3000 sheep and goats of their own; they lived, like all the rest, in semispherical huts.

Next day we arrived at a dry channel, called Zout Rivier, scooped through very saline ground, whence its name. The Bastard here had dug a fine watercourse, and hoped to be able to purchase the ground from Government. From all I could gather, the Mission Station of Almandel Boom lay about 45 m. s.s.w. Many lay places and corn farms of groups of Bastards were described as intervening between us and that place.

On the 27th we rode on, over a wide plain sloping gently to the N., passing Zout Rivier Kop, a large conical hill to our left, forming the N.W. extremity of the Great Karreberg Range, and commanding, I should think, an extensive view. We arrived at Haas Fontein, the only fountain we had seen since leaving Jonker Water. This is a very eligible spot for a village or a farm. Our path was crossed here by another great trek road, from the Achter Roggeveld to the Naauwte and Hartzog Kloof pastures. One Dutch farmer, the second we had seen since leaving Doornberg Fontein, lay to the N. of us, with a flock of 1500 ewes.

On Monday the 29th, we arrived at Krantz Kop or Lëeuwkuil

Spruit, one of the most saline spots I had met with, the water in the pools perfectly salt, and the channel completely lined with white incrustations. At nightfall we halted on a plain near Komanskolk, and on Tuesday the 30th, we reached Twee Rivier, so called from its being the junction of two rivers, the Fish and Zak. Here I found several Bastards in charge of numerous flocks and herds, and troops of horses belonging to Boers of the Roggeveld. Twee Rivier is a locality much frequented, and the level bed or bottom of the valley is, in some places, 2 m. wide, covered with fine pasture. The confluent channels can barely be seen winding tortuously along it. The water was in standing pools, and appeared to increase in saltness as it diminished. Twee Rivier was, I believe, one of the landmarks of the old boundary. We had hitherto been very fortunate in finding grass for our oxen, and after they had regaled themselves here, we prepared for a fresh start. Having now completed about two-thirds of our long journey, we found our worthy guide at a loss regarding the road.

On the 1st of February we travelled about 13 m., passing several pans; and on the 2nd reached Vogel Vley, where we found a fine pool of rain-water. I indulged in a little geology as usual, and found much to interest me. We rode on and spanned out near Melkbosch Fontein, to our left, the residence of a Dutch farmer named Jous, who also had a Bastard wife. I did not call on him, and regret this; but purchased a few vegetables rather scarce in this region. He lived in the usual sort of hut, and I believe has been here some years.

On the 3rd we passed over a high land, which I afterwards found was a portion of the main South African water-parting, between the Orange River hydrographical basin and the valleys of the western seaboard. Here the great trek road from the Hantam to the lower Zak River lay places intersected our path. We now descended towards Krom River, keeping the right side of one of its affluents. In the afternoon we spanned out at the Drift called Springhaan Kolk (Locust Pool). Here again the great trek road from the Hantam to the Great Salt Pan and Kat Kop intersected our path. From Twee Rivier to this we had in view all along to our left the Hantam Bergen, apparently about 35 m. distant. At the Drift were two or three Hottentots, living in a wretched state of poverty. We rode on, crossing the channel of Krom Rivier four times, passing to our left a small conical hill, and a lay place called Moordenaars Werf, and arrived on the evening at Bakens Werf, where we remained next day, Sunday. These are, I believe, chiefly Boer lay places. The waters along this river are more brack than any I had tasted. The pastures on the river channel were very fine, and there were numbers of "Abiqua" trees (? Tamarisk) along the banks.

On Monday the 5th we rode along the left bank ; a little below we found two or three Hantam Boers with waggons and semi-spherical huts. They were just about to move to the northward, among the pans and vleys s.w. of Kat Kop. They informed me that during the winter months, wild Bushmen were often to be found in this neighbourhood in search of stray cattle and favourite herbs. All along Krom River, we could observe to our left, the fine peaks Spijoen Kop (a landmark in the old boundary) and Spitsberg. We reached the bend of Krom River to the right, at a werf called Beenbreck—the southernmost point on the whole journey. Near us to our w. stood the magnificent peak of Kubiscoe, one of the Astronomer Royal's trigonometrical stations. We changed our course to N.W., crossing the river twice, the second time at a lay place called 'Nousi, where were numerous "skerms." We now had Roodberg and its outliers to the right, and the ranges of Kubiscoe and Langeberg to the left. Our path was here crossed by the great trek road from the Hantam and Luries Fontein to the pans and vleys.

Next morning the 6th, after being rather puzzled about the road, we contrived to find one which brought us to Kluitjes Kraal, the place we sought on the left bank of the river, and so called, no doubt, from hundreds of small boulders, among which the "skerms" lay. In the evening we encamped at a place called De Kop. The channel of the river was here pretty wide, as if occasionally swept by freshets, and a good deal of bush relieved the eye ; indeed, all along Krom River there was more or less of it. At De Kop I found a great deal to interest a geologist, and am satisfied that the whole basin would afford a month's gratification to any lover of the science.

Next morning, the 7th February, we crossed the river again to the right bank for the last time. Our way wound among granite rocks till we approached Zout Pans Fontein, where, for the first time, we met with fresh spring water, but not a blade of grass was to be seen. We took the right road to the high land, where we halted. Here I had a fine view of the great bend of the Krom River southward with its various affluents, and the distant gorge between the Kubiscoe and Langeberg ranges, through which it passes to join the Great Doorn River, which, in its turn, finally joins the Olifant River near the coast. A few Bastards came out to the waggon from the valleys below, thinking we were traders. We rode on, crossing several spruits, and in the evening reached a lay place called Kaptyns Kraal, on one of the larger affluents of Krom River. Here we found a few Bastards who cultivated gardens. Some of the children applied to me for Dutch books, but I was unable to gratify them. They belonged to Luries Fontein, where, I am informed, reside several very re-

spectable Bastards. I could not learn the distance to our left at which any surveyed lands lay.

On the 8th we travelled to Lospers Plaats, still in the basin of Krom River. This appeared to be a considerable lay place of the Bastards. It was a rippling fountain, water rather brackish, but the place appeared capable of great improvement. I never before beheld at one view such myriads of Namaqua partridges as I saw here. About 9 o'clock next morning they came in from the surrounding wastes in immense coveys, leading me to suppose that we were now entering upon a tract of very arid country with waters few and far between, and I was not wrong. In the basin of Krom River, our oxen had had little to graze upon, and not a blade of grass was now to be seen. We were informed by the people we had just left, that rains had not fallen for some time. Several roads radiated from this place to the Pan country, and Pella on the right, and the Roggeveld and Kamies Berg to the left. About 25 m. n.w. of us, we were informed lay a great salt floor called Boschluiss, about 9 m. e. of which is another of the Astronomer Royal's Trigonometrical stations; I believe on the main water-parting.

On the 10th February, we travelled over an extensive table land, passing a deep but small salt pan to the left, and crossing the upper part of several affluent valleys of Buffel River, found no water; though we had had a very long stage and encamped on the plain. Next morning we rode on, scarcely knowing which road to take for many miles, till we reached a dry pan. Finding numerous footprints of sheep, we concluded that some squatter had just left the place, and we took the right road, not knowing at the time that the left, as we were afterwards informed, would have brought us in half an hour to Alwyn Fontein, a great lay place of both Boers and Bastards. We moved gently on over an apparently level table land, covered with immense quantities of fine grass, which our oxen could not touch for want of water. In the evening of the 11th we arrived at a grav-water which we discovered accidentally. By means of a large baking pot, we contrived to quench the thirst of our poor oxen; and on the evening of the 12th we rode on to 'Norubý, another grav-water. This is in a fissure of the granite rock, in a natural basin. The appearance on all these sand waters, of small black fragments of ostrich shells which emit a very offensive odour, shows that they must have been used by Bushmen from time immemorial.

On Tuesday, the 13th, we rode slowly over the same level grass country, passing a grav water, called Gorasset, also in a basin of granite. We outspanned at a place some way beyond called 'Amibis, which lies in a spruit of Buffel River, in a valley where denudation appears to have scooped out the table lands. Here we found a few Bastards belonging to Lily Fontein Mis-

sionary Institution. Climbing out again, we travelled as far as Gamiep on another affluent of Buffel River. Along this lay numerous Boers, Bastards, and Traders. Here we were on the point of entering surveyed lands belonging to private parties. Passing De Wip, the first farm, we arrived on the evening of the 14th at Riet Fontein, and to my surprise I met here one family of the Beukeses, formerly resident at Bull Fontein, where I last saw the Orange River. They welcomed me with the utmost kindness, and with a degree of surprise at my sudden appearance from their own country, of which they seemed to have some fond recollections. The houses were well built, but the handiwork of their industrious father, then dead; and everything, even the garden, appeared to be becoming dilapidated. There was, however, abundance of fruit.

On Thursday, the 15th, we passed Eendorn and other farms of a worthy Scotchman named Kennedy, who is the only person in the country possessing a flock of Merino sheep. After a journey of two months and ten days, which might have been performed in 30 days, had we known the direct road, we arrived at Springbok Fontein on the 17th, at that time the largest mine in the country.

Through the kindness of the proprietors of the mining establishment I left my waggon here, and was delayed between Springbok and Hondeklip Bay for nearly six weeks, till the 29th of March, and engaged in preparing for a systematic exploration of the Region between Pella and Steinkopf for copper ores.

We were now to travel on a north-easterly direction in which Pella lay.

On the 29th of March, leaving private lands, we travelled to Omiep,\* crossing for the second time the main S. A. water-parting. Here we found the Burra Burra, and No. 6, mining companies at work. About a mile below is a permanent grav water. Next day we passed 'Arigas or Quick Fontein, a permanent spring, and a considerable Bastard and Boer lay-place during the summer months; the long valley below affording excellent pastures. It is, I believe, the eastern limit of the tract of country claimed by the Steinkopf Missionary Institution.

On the 31st, after travelling over a good deal of sand of which there were hundreds of dunes, we arrived at another great Bastard lay-place call 'Haip. I ascended this fine mountain and had an extensive view of the whole of Little Bushmanland, took numerous bearings with a small theodolite, and sketched in hilly portions, a practice I continued during the exploration. On the summit I observed the little circular hiding places of stone, from which the ancient Bushmen were wont to shoot the Zebra and

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\* From Omiep to the end of this paper about forty names of places are mentioned, which do not occur in Mr. Moffat's original maps, and sufficient data are not given in the text to place them in the accompanying map.—J. A.

Quagga. We found numerous families of Bastards here, chiefly the Cloetcs, formerly the proprietors of Springbok Fontein, and who are now on the books of the Institution.

On the 3rd of April, we reached the main channel of a great valley, at a place called 'Amasoans, a grav water in the sand bed, having passed the base of a conspicuous peak to our right called 'Oogorabip. This, but for the scarcity of water, would be the finest pasture ground of Little Bushmanland; by this I mean that portion of Great Bushmanland, in the neighbourhood of Little Namaqualand, and now included in the district.

On the 4th of April we proceeded to 'Oorees and thence to Zuur Water. At both of these places lay several Bastards.

On the 7th we travelled to 'Gams *viâ* 'Agen'huis, where lay a few Bastards. We passed among numerous hills and near two springs (in ravines of the 'Gams plateau) called 'Nesip and Little Gams. Next morning, the 8th, we arrived there and made up our minds to stay for a few days. At 'Gams we found a Hollander, named Hollembach, who once served in the Dutch fleet under Lord Exmouth in the Mediterranean. He had been here 15 years, and formerly resided in the Clan William District. He appeared to be a worthy man with an interesting family, who were to be pitied in this out-of-the-way place, with only Bastards for associates. He has, however, educated his children; two of his sons I believe are traders. I am told that he has long acted as a schoolmaster among Captain Witboy's people. A Bastard named Losper also lived here—had been here 18 years. 'Gams is a place very much frequented by the Van Zyls, Kennedys, and numerous other trekkers from the surveyed farms, as well as by traders, the pastures being excellent.

Hearing that Cupido Witboy, a Namaqua chief who formerly held sway over all the country of Little Namaqualand, and who still claimed authority over the aboriginal community, was at Pella, I sent for him. My object in seeing him was to ascertain the real circumstances of the country, so far as regarded native rights, in the event of our finding ores in it, in order that our tenure might be safe, if we should happen to secure centres in it. I thought also that as the Surveyor-General had not come thus far, nor mentioned Cupido Witboy in his Report, I should be able to cull information omitted by him. In the interview he gave me while here, I learnt a few particulars of his history, &c. Though arrived at a good age, he writes an excellent hand, which would shame many respectable Dutch farmers. The circumstances of this chief, which in justice demand investigation, will be noticed elsewhere.

On the 18th having spent 10 days in the neighbourhood, during which I culled a variety of information, we proceeded, *viâ* Schaap-

dragos, to Pella, where we arrived, keeping its valley, on the 19th. This place had to me one pleasant association. Thirty-seven years before, my father arrived here on his way from the Cape to Afrikaners Kraal (beyond the river) as a missionary. At that time the good Mr. Bartlett, of the London Missionary Society, laboured here. They were, however, both soon after transferred to another field near Griqualand. I found here the worthy Rhenish missionary, Mr. Schruijder and his family, who received us with the utmost kindness. There resided here, also, a Frenchman named Gabriel, formerly a lieutenant in the French guards under Napoleon. He had, I found, resided here many years. All the other residents were Bastards. There is an abundance of water here, but rather brackish, oozing from beds of calcareous or what one would rather call dolomitic tufa (for it is said to contain a good deal of magnesia). The place has capabilities, but there seems to be no attempt at improvement. Were the arable spots allocated to the most industriously inclined parties, no doubt some effort would be made. Ensnconced in high and barren hills the place is intolerably hot even at this pleasant season. Mr. Schruijder informed me that in the hotter months the heat was so great that though the missionary, he was compelled to resort with his family, during the nights, to the use of the semispherical mat hut. It can never become a place of any importance. I thought it strange that a village was established here about 25 m. from any waggon ford, instead of the neighbourhood of a ford. The chapel and mission-house were very rude and small buildings: the former, I believe, was Mr. Bartlett's old one patched up.

Our intention was now to traverse the country adjoining the river, as far as Henkries, in a w. direction.

On the 21st we made an attempt to reach the river about 4 m. distant, but after winding in and out of dry channels among rugged and precipitous hills, we were stopped by a ledge of granite. Spent a day here, and on the 23rd travelled by way of Pella again to Little Pella, a beautiful little oasis, similarly ensconced among hills at the head of a deep granite ravine, passing several unoccupied lay places, 'Ougap, 'Oos, and Vettong. I could not but be amused at the manner in which Dutch names of places of identical meanings were gradually replacing the ancient Hottentot or Bushmen ones. The fountain, or rather spring of Little Pella, also oozes from a bed of tufa, and is surrounded with a good many large trees. A few small laps of soil may here be cultivated as gardens.

On the 25th, we rode on to Sand Fontein, a grav water. There were here one or two Damara servants of some trader. On the 26th we proceeded to Rosain Bosch. This is a considerable lay place, but only a few of the neighbouring waters were occupied.

We travelled on to Wortel ('Nomaop), one of the finest grazing places in Namaqualand, equal to 'Gams and Amasoans during most of the year. Not only Bastard and Namaqua, but Boers and Traders frequent it.

On the 29th, travelling on over an extensive plain, which commanded a view of the Orange River to our right, we passed through two gorges formed in a circular group of very high hills, called Daben'norup, the table hill of which is one of the highest in the country. We arrived at 'Oms drift, the first available waggon-ford below Pella. This is one of the Nisbet Bath fords, passable only at low water. I believe the missionary has at that place a boat for the purpose of crossing it when the river is full. Here we remained a day or two, and in my wanderings along the river above the drift I saw for the first time, people whom we may properly call Namaquas, and like the Korannas to the E. on the opposite bank, it may be said that the majority of these aborigines will be found in the neighbourhood of the river. In the absence of a horse I took a trip on ox-back in search of supplies, and arrived in the evening at a spruit called 'Un'ubep, some way E. of the drift, otherwise called Hartebeest River. Found here an old Namaqua widow-woman, named Amagus, with her sons and their families. She is, I believe, considered the richest native individual in Little Namaqualand, and carries on her stock farming in aboriginal style with an alacrity quite surprising amidst the retrogression apparent in all her contemporaries. Traders are not sufficiently clever for her; but no doubt at her death her sons will, as in other instances which may be cited, get rid of all their inheritance.

On the 5th of May we followed the river as far as a lay place called 'Oniams, where we observed several centres had been taken as well as at Daben'norup.

On the 9th rode on to 'Uma, where the river narrows among mountains. Thousands of baboon spoors are to be found here, showing what numbers must pass between the high and rugged hills and the river bush, and that the place is seldom frequented. Here we were obliged to leave the river and follow up the sandy bed of one of its affluents, in order to arrive at the more open country, for we could not traverse the bank. Below, at the distance of about  $1\frac{1}{2}$  m., we saw the opposite side of the Nisbets Bath lower ford, viz. Sand or 'Naragus drift,\* where it emerges from the river, to reach which with a waggon would occupy us a whole day, viâ Ontsammas.

On the 9th we reached Ontsammas at the upper end of the 'Naragus spruit.

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It was at this drift that Captain Alexander crossed in 1837.



On the 10th arrived and remained the whole day at Vnurdood, two large conical black hills abreast. The country about this appeared quite destitute of any kind of vegetation, and had a very desolate appearance from the number of dark bare hills. Starting by moonlight, we lost our road to Henkries and wandered over an extensive plain without wood or grass, and found ourselves next day at noon at Gazelschap Bank, or 'Ou'mup, on the road to Steinkopf. We however turned off to Henkries, far famed at that time for prospective copper mines.

We found a place similar to Pella, but capable of cultivation to a greater extent and better adapted for a village of Bastards. Here we saw one Jacob Baali and his children, a son of old Jan Baali, who in 1837 surpassed Amagus with his riches, for Alexander speaks of his having had thousands of cattle and sheep. The fountains as usual ooze from beds of tufa; the whole valley is composed of this; though transversely a perfectly level bottom, it has a gentle glacis towards the river, 4 m. distant, with three breaks or terraces of 50 or 60 ft. at nearly equal intervals in that distance. This will afford study for a geologist. We examined the mountainous country in the neighbourhood, and saw no prospects of success on such a field.

On the 20th we left the river country and travelled towards Steinkopf. The whole of these sandy parts afford excellent pastures after rains, especially among the dunes to the eastward, along the N. side of the Amasoans Valley.

On the 21st we reached a pass called Eenriet Kloof, on a range of hills bearing N.N.W., where we found a grav water. We were now in the 'Nou, or country more immediately pertaining to the Koopfontein or Steinkopf Missionary Institution. It is a permanent lay place and the pastures are good, though I should think from being near the main water-parting, it must be very cold in the winter.

On the 24th I inspected the parts near 'Aripis (arawis), about 5 m. to the w. This is well adapted for a small village; a very fine water, and the situation open and airy.

After above date, having to take a trip to Hondeklip Bay, I was not able to see Steinkopf till the 16th of June. Whilst absent I had another excellent opportunity of seeing the Missionary Institution of Komaggas, and the country about it.

On my return to Eenriet on the 15th, we made preparations to move to Steinkopf, and reached it after a third time crossing the water-parting, with a short stage in the evening of the 16th. I was surprised at the wretched appearance of this station, which certainly does not betoken progress in the people. Saw only a mission-house and chapel, the latter a pretty good building. There were two outhouses belonging to Bastards, one resembling a farmer's

kitchen or rondavel. There was also a sort of dry garden, walled in, and the fountain or spring is a miserable affair. If properly attended to, the place might be much improved. Leaving the waggons at Steinkopf, I started on the evening of the same day, the 16th, for 'Gams, in search of supplies, as I had to attend to all the wants of our party. I was absent till the 30th. During this trip, which I performed partly on horse and partly on ox-back, I had opportunities of gaining additional information of the eastern half of Little Namaqualand. I met with another respectable Namaqua named Gamup, with his kindred, living in patriarchal style at Gudous near Vnurdood. Their simplicity and kindness were perfectly aboriginal; I found he was a relative of the widow Amagus.

On my return to Steinkopf we started on the 4th of July, for an exploration of the middle parts of Little Bushmanland. Passing a little spring called Abedas and Brak River, the channel, which empties its rain waters in Henkries Valley, 'Oogas or Vries Kolk, all lay places, we spanned out at Leeuw Poort. All over this neighbourhood and Steinkopf segregated groups of Bastards are to be seen at every small spring or pool, if there is grass. We rode on, passing Klein Eenriet, to a place called 'Arenhous on the plain; thence with a guide we went to Eendop, riding on horseback over the country to the left in the neighbourhood of the 'Amama grav water, near which is a fine curved range of hills. After inspecting the cupreous run at Eendop, we returned to 'Arenhous, thence to 'Ams, a considerable lay place, where we found a few Bastards, who had come from beyond Pella to convey copper from Concordia and Springbok to the bay. This place is near to Quick Fontein before alluded to. Thence through Orees Kloof and back to Leeuw Poort, both in the same curved range of high hills, we returned to Steinkopf, *viâ* Zwart Puits cornlands and De Banke, both Bastard lay places. This concluded my waggon journeys, after which I was absent for 3 months in Graham Town and at the Cape.

On my return I have had occasion to go down to Robbe Bay (Port Nolloth) to survey the village allotments there, and paid particular attention to the main road and its capabilities of repair. Subsequently having occasion to go down to Hondeklip Bay, I travelled the main road with a special view to examine its capabilities, and on my return had another opportunity of seeing Komaggas Missionary Institution.

[In the above I have not alluded to short jaunts on horseback to different parts.]

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IV.—*Journey from Little Namaqualand Eastward, along the Orange River, the Northern Frontier of the Colony, &c. &c., in August, 1856.* By ROBERT MOFFAT, Esq., F.R.G.S., Government Surveyor.

Communicated by the COLONIAL OFFICE.

*Read, February 8, 1858.*

IMPRESSED with the notion that, as the Orange River has been declared the permanent boundary of the colony, and was still unexplored, a knowledge of its geographical position would be valuable, and that a correct map of it, incorporated with that last sent, would enable the Colonial Government at least to arrive at an approximate estimate of the extent of its waste lands still available, I resolved to construct one on my homeward journey from Namaqualand to Kuruman. His Excellency the Governor, Sir George Grey, F.R.G.S., on hearing of my intentions, unexpectedly afforded me some encouragement by offering to assist me in defraying the expenses of it. Having availed myself of this liberality, I consider it my duty to send the map, and the following memoranda explanatory of it, to the Royal Geographical Society.

I shall proceed to give a short journal of my route before noticing other subjects.

I left Gams on the 13th of August, and, instead of taking the direct road to the boat ford (scuit-drift), made arrangements for keeping the river in order to ascertain its course. As the lung sickness was prevailing in the mining locality, which I had just left, I found myself compelled to dispose of my team of oxen and to hire others at different stages, an arrangement I afterwards had reason to regret, as I was thereby subjected to the caprice of my drivers. The first team I hired as far as the scuit-drift, and, crossing the Kabass Hills at Pofadder, struck the river first near 'Ohoop (lat.  $28^{\circ} 54'$ ), an immense valley, the lower part of which was covered with the most extensive array of aloë-trees I ever beheld. The spring, exuding from a bed of travertin, is about a mile from the river and very brack. On the 19th we reached Amam Peak (s. lat.  $28^{\circ} 49'$ ). Next day, the waggons passing on, I rode down to 'Norusep, a lay-place on the bank of the river, where were two families of Namaquas and one of Bushmen, living in a degraded state. They informed me that there was still an hippopotamus or two in the bend to the west. Passing another "lay-place," on the river E'nap, we halted at Reenkreek. On the 21st, leaving the river at another called Stijerkraal, we remained the night on the plain (lat.  $28^{\circ} 39'$ ); on the 22nd, at a prominent peak (lat.  $28^{\circ} 37'$ ), 8 or 9 miles N. of the great peak called 'Arnam, which must be visible at a considerable distance; on the 23rd and 24th, in a sand channel, which we excavated for

water (lat.  $28^{\circ} 36' 45''$ ); while here I rode down to a thermal spring, in the bed of the river, called 'Oa 'Ames, and found a Bastard family from "Nousi," and one old man from Pella, making use of its waters, and was informed that it is much frequented in the summer season, and had always been used by the Namaquas: having no thermometer with me I did not examine it. As the river was daily expected to flood, the invalids were growing apprehensive and were about to return home. Commencing again on the 25th, we reached the scuit-drift 'Orodoup (lat.  $28^{\circ} 30' 45''$ ); on the 26th, saw a small horde of Bushmen hunting springboks, hundreds of which they contrived to surround on the edges of precipitous rocks, and thus secure a great number: here, my drivers, having fulfilled their engagements, returned to Pella with their oxen. I had been hoping to procure other oxen here, and to keep the south bank of the river, to De Neus ford, so as to examine the colonial lands bordering on it; but I saw no hope of being enabled to do so leisurely; and as all were in daily expectation of the river filling I judged it the more prudent course to cross, especially as by not doing so I should be subjecting myself to a six months' detention on the colonial side. A report having come from the country, E. of the Aintas R., that numerous droves of elands had come from the Kalagare to that neighbourhood of the river, a hunting party was about to start from Nousi and to cross at De Neus ford, but it was evident their movement would be hurried; moreover, I wished to see the Aintas at its junction with the Orange River, as it had never been laid down. I crossed the stream in a dilapidated old boat, made of willow. After taking the waggon to pieces I happily met here with an enterprising native of the Bok family, and entered into an engagement with him that he should convey the waggon to Blydeverwacht, and to take the high road round the Noup table-lands as far as Oros, and at the same time provide me with a competent guide, so as to enable me to keep the N. side of the river on horseback or foot. On the 1st September we continued our journey and halted on the high-lands (near a coppie, lat.  $28^{\circ} 27'$ ), passed a place called Oubes (or Africaner's Kraal), where the London Missionary Society had a mission in 1818. The ruins of the Mission-house were still to be seen, and arrived at 'Names (or Blydeverwacht), where I found the Rev. Mr. Thomas and his family, of the Wesleyan Society. This little tract of country is still in the possession of the Africaner family; but its chief jonker resides in the neighbourhood of Walwies Bay. There were several enterprising Bastards here, anxious to establish themselves and turn its capabilities to account, but were unable to procure a footing, so that the most promising individuals, to whom the Missionary has to look for co-operation, are living there by sufferance.

On the 8th of September I left 'Names, the waggon taking the circuitous road, and my guide and self the bridle path, along the southern base of the 'Noup-plateau, keeping the river in view most of the way on the right. In the evening we reached Noup ford (lat.  $28^{\circ} 26' 20''$ ), where we met a few families of Namaquas belonging to the above village. Next day, procuring one of them as a guide, we traversed the most rugged path it was ever my lot to travel. The fetlocks of our horses were actually bleeding through being so repeatedly bruised. At one point I ascended the plateau, in order to take a few distant bearings. Late in the afternoon we reached the embouchure of the Aintas, at a spot called 'Oos, and, to my surprise, I found it not more than 80 or 90 feet wide, with a deep sand-bed fringed with the usual river trees. In the evening we proceeded along a beautiful sand-channel, parallel with the river, to a spot nearly opposite 'Araganoup Peak (on the other side), where we bivouacked for the night (lat.  $28^{\circ} 27'$ ).

On the 11th, reaching the bank of the river over against the peak, and keeping it for a few miles, we passed another village of miserable Namaquas. In this interval we saw some fresh traces of the hippopotamus, and were informed that there were still two of these animals lurking about this part of the river. In the afternoon we again travelled among some rugged hills, by a bridle path scarcely passable for a horse, and along several sand-channels studded with mimosas and other river-trees, and, about sunset, reached the neighbourhood of the fall, of which men have heard so much. It being too late to proceed in search of the fall, the noise of which we could faintly hear, we rested for the night on the bank of one of the lateral channels of the river (lat.  $28^{\circ} 33' 45''$ ). Next morning, we saw, about a mile to the southward, a small column of spray, which led us to our object: this we reached, after crossing several channels, full of standing pools, and two rapid streams. I need not say that it was a very grand object, and must be still grander with a full river. I did not know whether to consider the fall itself, with the beautiful cascade on the left and the granitic boss on the right, or the deep chasm below, with its parallel and precipitous walls and the now apparently insignificant stream meandering below, the grander object. Immediately around we had a chaotic assemblage of rocks and boulders, tossed into every position, and perforated on the surface with waterworn holes, from the size of a cup to that of a caldron, some of them very deep and still containing water, showing that the rocks we traversed to reach the stand point were frequently covered with agitated waters. After lowering myself as far as I could to get a commanding view of it, to the dismay of my guide (who every moment expected to hear a splash into the

chasm below), and with its spray slightly wetting the paper, I contrived to make a careful sketch of the fall by means of a camera lucida, and to fill in the details by the naked eye. Not having provisions to enable us to delay so as to indulge in a better survey of this interesting portion of the great river, on the 12th we continued our journey along it, passing numerous Koranna lay-places, not frequented at this season. In the evening we passed several of their villages, and reached a place called 'Ai'aras (or Roodkop), over against Rhinosterkop, on the opposite bank (lat.  $28^{\circ} 41'$ ). From Roodkop I saw to the s.e. the junction of the wooded channel of the Hartebest River with the Orange, 4 or 5 m. distant. On Saturday, the 13th, we arrived and remained the sabbath at a Koranna village, near a high mountain opposite De Neus ford (lat.  $28^{\circ} 43'$ , about), from which I took some distant bearings. On the 15th we reached the village of Jan Cupido, a petty captain, at a point where the river, here very wide, forms an elbow. On the 16th, by the high road, avoiding many villages, we gained, with our tired horses, the werf of one Pampier. On our way, the ruins of the church, built by the impostor Stefanus,\* were pointed out to us on the opposite bank, and, a little more to the e., the former station of the London Missionary Society, called Oorlams Kraal or Bethesda, abandoned in 1821. On the 17th, passing 'Oros, a small village of Namaquas, I arrived at the waggons at a place called Dabus (lat.  $28^{\circ} 26' 30''$ ), where the party who had conveyed me had concluded his agreement, and intended to spend a few days hunting on the border of the Kalagare; but rains falling to the n., followed by refreshing winds from that quarter, dissipated all their hopes immediately, for the game, gladly snuffing the cool air, speedily migrated to their wonted pastures in these unexplored wastes: the two, therefore, returned with their oxen to 'Names.

At Dabus I delayed a long time in expectation of oxen from Kuruman, which I had directed should be sent by a certain date. The river, having risen, was impassable; and, being unable to leave the waggon with so many straggling Korannas in the neighbourhood, I could not extend my explorations from this point. Unable to wait longer, I endeavoured to collect a team of Koranna oxen, and succeeded: these I hired as far as Witsand. Hearing that the Griqua chief, Waterboer, whose boundary reached to Eis, was very strict regarding the passage of strange cattle through his territory on account of the lung sickness, I was compelled to abandon my intention of keeping the river beyond that point; and fearing that I should be put to considerable expense by persisting in my plan, I decided on taking a n.e. course

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\* For an account of this man, see Campbell's 'Travels,' part i. p. 537.

on my arrival there. We reached Uisip (lat.  $28^{\circ} 23'$ ) on the 30th October, and a little beyond met with messengers from the Kuruman, bringing the intelligence that oxen could not be sent, as it was my intention to pass through Waterboer's territory, where oxen from that quarter were not permitted to travel. These messengers, who were Bechuanas, had come the direct road from Kuruman at the wrong season, and had been five days without water. I afterwards found, that on approaching the river they had become so faint and mentally bewildered that they lost each other in the open plain, and found the stream at spots 2 or 3 m. apart. East of Uisip I found very few Koranna villages, the majority of the people having crossed the river for fear of the cattle sickness. We arrived at Eis on the 4th of November, passing a place called 'Aba aap (lat.  $28^{\circ} 47'$ ). We then took the Witsand road, with the Schurvebergen to our left and the Langebergen to our right. On arriving there and sending back the hired oxen, leaving the waggon in charge of a native, I kept the base of the latter range for about 30 m. on horseback, and crossed them a little beyond Andries Fontein. My horses knocking up a few miles beyond, I walked another 30 or 40 m., and arrived at Khatue, where I procured fresh horses, and crossing the Gamohan range arrived at Kuruman on the 14th of November, after an absence of two years from my family.

The position of Gams, my starting point, was ascertained by a running triangulation from Vogel Klip and Ouberg (Mr. Maclear's two northernmost beacons). All my observations of lat., which were in every case of stars on both sides of the zenith, were made with a sextant, kindly lent me by Mr. Maclear. Bearings, backward and forward, most of the way were taken with a small portable theodolite. I made three attempts at taking the long. by observation of moon-culminating stars, with a very good portable transit instrument; but did not in any case succeed, on account of my watch stopping so frequently, and the consequent difficulty of ascertaining even the rate, which afterwards discouraged me from making an attempt. Otherwise, I should also have succeeded in observing two or three occultations.

My having fixed the lateral limits of the course of the Orange river correctly, and the meridional positions of the junctions of the Aintas and Hartebest rivers approximately, will, I trust, be some trivial contribution to geographical science.

*Physical Structure of the Country, including that traversed on my last Journey from Colesberg to Namaqualand.*

It is very difficult to convey an adequate or even a right notion of the physical structure and conformation of an extensive tract of country without proper sections. These I had not the means of

providing correctly, viz., the relative vertical elevations, but shall endeavour to convey my meaning without.

Little Namaqualand, or rather the mining locality, is evidently the nucleus of an extensive metamorphic district, if I may judge by the concentric appearance of the various lines of strike which I crossed, and the average dip of the rocks to the E, which is nearly vertical. Had I previously seen enough of this to enable me to form some conception of it of this nature before commencing my journey, I should have made an effort to note all the lines of strike and variations of dip; for with such a specific object in view, curiosity would have prompted me to expend a good deal of labour in order to see whether it were really the case. As a description of the conformation of the mining district would occupy a lengthy paper, I shall commence with the country about Pella.

It will be necessary for us to picture to ourselves a wide table-land of nearly vertical metamorphic rocks extending considerably to the eastward from this place, and capped with a horizontal stratum of coarse sandstone rock, as far as about E. long.  $20^{\circ} 30'$ , where these sandstone rocks begin to increase in dip as you proceed eastward as far as E. long.  $22^{\circ} 30'$  (showing intervening beds of another nature), where the dip begins to be reversed, and suggests the existence of an extensive primitive basin, but in the outcrop of which the strata appear to thicken, and other sub-cumbent rocks to be developed as you advance as far, say, as E. long.  $25^{\circ}$ .

We must farther picture to ourselves this whole region as having undergone great denudation, and the western side of this basin as being laid bare, so as to be traceable only by a few detached hills, and the whole of the sandstone platform in the w. side of it, with the exception of that which now forms the Noup plateau, completely removed, and the crystalline table-land laid entirely bare and furrowed down to a certain draining line, leaving only hills of mere indurated rock, and groups of black conical hills of greenstone (the subterranean disturbing agent), all which appear to increase in height as the drainage deepens.

And, finally, let us picture to ourselves this draining line or channel intersecting the said basin, furrowed down to a greater depth by that denudation, or subsequent periodic floods, so as to touch the surface of the metamorphic table-land below, at Uisip, and thence westward to run along the surface of this table-land between the superincumbent sandstone hills for a distance of 70 m., deepening gradually but little, and widening irregularly from 500 yards to  $1\frac{1}{2}$  or 2 m., as it divides into numerous channels reticulating from countless islets, many of these again joining the main stream, where, forming a few rapids, it is suddenly precipitated about 90 ft. into a deep chasm about 80 ft. wide (and



say 150 ft. below the bed of the upper channel), with parallel and precipitous walls extending apparently a few miles, and which seems to have originated in a great fissure at right angles to the strike of the metamorphic beds—the other fugitive streams passing the main fall in several lateral channels, which converging again join the chasm below, leaping over the edge, of which they form several beautiful cascades, and the reunited waters in a lower bed meandering among rugged peaks till they approach the sea; and we shall be able to form an indistinct conception of the conformation of the region in the neighbourhood of the great Orange River.

That such a crystalline table-land once existed there is every probability, and such portion of it as remains appears to extend considerably to the s.e.; for, about 160 m. from the waterfall in that direction, at a place called Jonker Water, passed on my westward journey, I discovered the saliferous horizontal rocks of the colony, thinning out upon nearly vertical metamorphic schists (strike mag. N.), at an elevation rather higher than the bed of the river where it intersects the Doornbergen; and about 130 m. s.s.e. of the fall, I found on the same journey a formation evidently subcumbent to the above saliferous shales, the lowest stratum of which was a conglomerate resting on abraded and polished granite, and filling what seemed to be a depression in the metamorphic rocks. Moreover, the lateral water-partings of the river are of an uniform height with the more elevated outliers and groups of hills which skirt the channel: for instance, the highest hills about Pella and Gams are, I believe, considered by Mr. Maclear on a level with the great area of the flat near Ouberg (which I afterwards saw formed the water-parting), viz., about 3600 ft. As the country about Little Namaqualand has undergone great disturbance, the rocks in those highest stations are at a dip. The surface of our metamorphic table-land has only been preserved entire in such instances as the Noup plateau, which suddenly rises higher than the rounded and abraded summits of the river hills, and is capped with a perfectly horizontal stratum (apparently) of sandstone between 50 and 60 ft. thick, altogether forming a fine object to the view of the traveller from the s.w.; I should suppose the elevation of this plateau to be about 4000 ft.

The waterfall is a grand object, and the appearance of the sides of the chasm and the aspect of a group of black conical hills of greenstone about 5 m. below on the left bank testify that a fissure must have existed in which the broad waters of the river found a vent; and that that rock was the subterranean disturbing agent which formed it. Compact gneiss is the rock which the river channels traverse immediately at the waterfall (strike true N. dip, say  $90^{\circ}$  E.). One side of the fissure still remains perfect,

and presents on the left bank of the fall a gigantic boss of granite with a perfectly vertical wall, over the round top of which the exfoliating masses are gradually becoming displaced. A cascade on the right bank of the fall at right angles to it is formed by one of the lateral channels before described as passing the fall. I could see the polished lips of two others on the edge of the chasm, on the left bank some way below. As stated in the journal, it was with difficulty that I crossed two of these streams, and several dry channels on the N. side, to reach my stand point; so that there can be no doubt that at the time of my visit three cascades were in full operation on the left edge of the chasm independently of the main fall; and when the river is full, there must be at least ten beautiful cascades W. of the fall in simultaneous operation, all formed by the lateral streams converging to the edge of the chasm at various intervals, and thus circumventing the main fall; and the dimensions of the streams precipitated at this point must be still grander and terrific. But to see them all at one view would be next to impossible, or even to reach the main fall at such a juncture would be hopeless without a pont, and even with one, dangerous. I did not examine this interesting locality so much as I could have done had two or three hours more been permitted me.

The circumstance of the river, for a distance of 70 m. above the waterfall, varying in width from 500 yards to between 1 and 2 m., and forming numerous channels and islands, will perhaps be accounted for by my supposition, that in that interval it runs along the upper surface of the metamorphic rocks.

The great basin (or portion of a most extensive formation) to which I have alluded as perceptible, while we proceeded eastward from the waterfall, is evidently a primitive one, for we find, for some distance, three or four varieties of rocks\* dipping to the E., and at the Schurvebergen (of sandstone) the dip is reversed, and as we proceed, decreases, revealing in succession in descending order, sandstone (composing the Langebergen), ribboned schists and mountain limestone (composing the Gamohian range), and then again between Kuruman and Motito and beyond the latter sandstone evidently much disturbed and fused by basalt. Here the dip is only about  $5^{\circ}$ , while, at the Schurvebergen, it is nearly vertical, and also in the Langebergen; but in many parts of the latter I observed it to be about  $45^{\circ}$ . What other rocks may occur in the interval, covered with sand, between these parallel mountain ranges, it would require more careful inves-

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\* I regret to state that specimens of some of these which I had collected for the S. A. Museum were thrown away unintentionally by some of my servants on the latter part of my journey. When absent from the waggons I found amygdaloid disturbing this portion of the basin.

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tigation to discover; and I think that if we had proceeded still more to the E., we should have met with the above-mentioned rocks again in ascending order on the western outcrop of another great basin of the same formation, and probably found a complete section of all the later rocks before approaching the E. coast. I have seen the limestone alluded to occurring on the Doornbergen with these beds 4 or 5 m. thick of interstratified shales, with the superincumbent ribboned schists, dipping to the N. at an angle of  $45^{\circ}$ , and this satisfies me that the southern curve of this basin is intersected by the Orange River, so that a portion of it falls within the colony between that and the Hartebeest River.

Having found no fossils except in the horizontal rocks of the colony, and a few very recent beds, I have no guide for determining the relative ages of older rocks which have come under my notice; but assuming this basin to be a portion of the great carboniferous formation of the southern continent—the main portion of which, with its coal-beds, if there be any, must be developed to the E., and most probably on the seaboard—I shall be able to give some notion of its relation to other rocks which I have examined. The great horizontal formation of the colony is, I believe, considered to be equivalent with the new red sandstone of Europe, and, as above stated, I found saliferous shales (apparently horizontal) thinning out on the surface of nearly vertical crystalline schists. As I proceeded westward on my journey through Bushmanland, I found these shales extended the whole distance; in them I met with no fossils, except what appeared to be corals on the surface of large calcareous masses (presenting horizontal concentric rings of spar), and nodules parallel with the general bedding; numerous foot-prints of birds were everywhere visible. But as I approached Krom River valley (S.E. of Little Namaqualand), I observed they had a gentle dip, say  $5^{\circ}$  to the eastward, and overlying in descending order in the valley,

1. Sandstones.
2. Shales including ferruginous nodules.
3. A conglomerate, the base of which was a grey marly stone, including spheroidal concretionary nodules of the same material of various sizes, and numerous thin seams rather harder than the base-pebbles and angular fragments of mountain limestone, presenting a weathered appearance, detached and cemented together in masses; fragments of slate resembling the ribboned schists surmounting the mountain limestone (before alluded to). Amygdaloid fragments of all the crystalline rocks from the size of a pea to that of a ton weight, and basalt. The upper portion was sparsely disseminated with small fractions of above rocks. Hollow ferruginous nodules, the base presenting a scoriaceous appearance,

and containing thin veins of gypsum. The whole appeared at Dekop, where I examined it, to be about 200 ft. thick.

4. Abraded or polished granite, with a very uneven surface, supported the whole.

It was evident the rocks thus described occupy a great depression in the metamorphic table, and are newer than those which compose the basin described, and older than the saliferous formation of the colony, and bear a great resemblance to the Permian rocks of Europe, if we may be permitted to judge by included fragments in the absence of fossils. If my conjectures hold good, it will probably be found that in South Africa they are conformable with the secondary formations and unconformable with the carboniferous, unless they prove to occur otherwise to the E.

Another important fact is, that in all the horizontal formations of the colony which I have examined (chiefly on the N. side), the volcanic rocks have only had the effect of hardening such parts of the strata as they have pierced: the result is that all the outliers of plateau and small ranges composed of these rocks owe their existence to this circumstance; for whether we examine the country from Toverberg, near Colesberg, to Dekop in Krom River Valley, or Platberg, near Harrismith, and Mosheshe Mountain, both in the neighbourhood of the Drakenberg, we shall find almost every hill or range with a nucleus or backbone or capping of basalt, the absence of volcanic rocks in the greater portion of the area having facilitated more complete denudation; whereas, in the older rocks, sandstone with pebbles traversed in my last journey have been disturbed, and, in some instances, partially fused, so as to resemble puddingstone. At Uisip, I found amygdaloid the disturbing agent, and at Motito and Lattakoo (east of Kuruman \*) great quantities of basalt, which had so altered the sandstone that I mistook it for amygdaloid till I observed the structure of the pebbles included.

Of the more recent formations (tertiary and post-tertiary) occurring in the neighbourhood of the above-mentioned older formations, and especially along the river, I shall be able to give only a similar desultory account.

I entertain little doubt that if all those spots and hollows called vleys, pans, floors, and saltpans, which are found all over Bushmanland, were examined, alternate beds of salt, gravel, and marl would be found. The existing saltpans are considerably more hollow than the others, and are, perhaps, frequently silted. Many of these saltpans are fed by springs of brackwater exuding from

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\* These places may be seen on one of my maps in the possession of Mr. Arrow-smith.

the saliferous beds in which they occur and by long valleys which convey summer torrents. One spot I examined, called Vogel Vley, evidently formerly a lagoon which had burst its barriers, and found under a cliff facing the N. a thin bed of marl a few feet below the surface, containing fresh-water shells (apparently *Paludina*) and covered with the débris forming the talus of the cliff. My journey through Bushmanland was performed in great haste, so that I was unable to indulge in a further search for fossils.\* On the surface of the mountain limestone in the neighbourhood of the Kuruman (Lattakoo), I have found, among the accumulations of travertin around a spring (called Mapoteū), several freshwater shells about the same size (probably *Succinea*).

Along the Orange River recent deposits are very insignificant in extent. West of the waterfall, in what may be called the lower draining-line of the river, large accumulations of calcareous matter (in beds alternating with others of a frangible, and, when dry, powdery structure) occur in such valleys as 'Oboop, Pella, and Henkries. From the presence of common salt, which appears to be abundantly disseminated in them, one would suppose these deposits to have been effected in waters connected with the sea. From their homogeneous and highly-concentrated nature, it is, at all events, natural to infer that they were effected in tranquil water, and formed sheltered bays or inlets from an arm of the sea which, so far inland, would, of course, be subject to the river currents. The great valleys of Pella and 'Oboop are connected with the river-gap by means of very narrow gorges, the one a mile, and the other 4 miles in length. The Henkries valley, again, in which the deposits are more extensive, laterally opens out at once into the river-gap. The beautiful terraces of these deposits in this valley—of which there are three or four—suggest the idea of successive and sudden changes in the level of the country. Common and other salts abound also in the thermal springs so numerous in this metamorphic district: these chiefly occur in dislocations. On my journey, I met with two in the bed of the river.

It is difficult to say whether the immense quantities of carbonate of lime found in these deposits are to be traced to the metamorphic rocks which are drained by these valleys, or chiefly to the waters of the Great Orange River, which contain large

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\* The whole of the surface deposits of Great Bushmanland are thoroughly impregnated with common salt, therefore the waters contained no pools; vleys and beds of river channels are always freshest after the rains, as the water lessens in depth in proportion to the surface it covers; it increases in saltiness till it becomes perfect brine.

quantities of it in solution, from the fact of many of its tributaries traversing limestone; for on all the higher lands composed of those old rocks are to be found innumerable small accumulations of travertin, lumps of which, when fractured, show a concentric structure, formed, no doubt, by the percolation of rain-water through the sand, which is intermixed with grains of lime.

Above the waterfall, again, detached portions of (what appear to have been formerly continuous) river-terraces, nearly as far as Uisip, are found resting on the surface of the vertical metamorphic schists and beyond on sandstone, and are composed of a breccia, a base of travertin, with angular fragments and rounded pebbles of ribboned stone. The upper surfaces of these terraces are apparently about 100 feet above the present bed of the river. From the fact of my finding waterworn pebbles of this rock (ribboned schist) at the distance of several hundred yards, and, in some cases, a mile from the river, I am led to suppose that it has been subject to great floods. The uniformly level surface of some of these terraces (which have, no doubt, been destroyed by the torrents from the adjacent country, from which small draining channels intersect them in every direction), where portions of them remain entire, suggests the probability of their having been deposited in comparatively tranquil waters; if so, it is not unlikely that the river from Uisip to the waterfall once presented the appearance of a long serpentine lake, in the middle of which the river-current flowed.

I had not an opportunity of examining the river above Eis, but from Bull Fontein to Brieschap I found the substratum of the river-terraces resting on the sloping base of the argillaceous hills (ribboned schists), which overlie the limestone on the s., to be composed of a fine blue conglomerate, passing upwards into a coarser, both including small waterworn pebbles and rounded fragments of the limestone, and pieces of crystalline rock and shales, altogether about 50 feet thick; upon this rested a bed of breccia, with a base of travertin, similar to that before described, in some places 4 or 5 feet thick, no doubt accumulated under water when the bounds of the river were narrowed. I afterwards observed that the valleys, by the drainage of which these rocks were deposited, revealed in succession, as I ascended them, ribboned schists, mountain limestone, crystalline schists, and the saliferous shales resting unconformably upon these.

There is, however, a deposit peculiar to the whole of the Orange River from the junction westward, which now fills up such gaps as have been formed by the removal of the greater part of the river-terraces and covers the islands. This is a very rich mud, which when dry is an almost impalpable powder. It is this

which supports the dense bush which fringes the banks of this stream and its spreading channel, and covers the island for a distance of 70 miles below Uisip. At the mouth of the Aintas I found a great quantity of this deposited from the waters of the Orange, which sometimes rise to a considerable distance in the channel of the former river. In the cracking mud at the bottom of the channel of this river which intersects these deposits, I found nodules of older and hardened mud, which had, no doubt, been torn up from the old bed by a débâcle.

Even in the nature of this most recent stratum, as well as in many facts before-mentioned, there are evidences that the country is undergoing desiccation; for on the N. bank of the river, which we kept for a few miles E. of the 'Araganoup Peak, my guide pointed out to me the track of his party's waggons some fifteen years ago (this could be perceived wherever it had crossed a ridge and where they had cleared away the stones) on the banks, which were then bare of trees; but the bush had now become so dense that it was difficult to traverse them even on foot.

But this subject, the gradual desiccation of the continent, is one for which abundant illustrations could be found, and which alone would occupy a lengthy paper.

There is another point of interest which bears upon the nature of the deposits along the Orange River, and especially upon the character of those in operation in the sea-bottom fed by this river, but perhaps would be better enlarged upon in a paper on the above-mentioned interesting subject, viz., the relative extents of the draining surfaces and distances of the sources of the main tributaries of the Great Orange River. Regarding this river, extending from E. long.  $24\frac{1}{2}^{\circ}$  to the sea, as the main trunk, it may be said to have five of these, viz.:—

	Drainage Surface in Square Miles, about	Distance of Sources.
The <i>Oup</i> or <i>Fish</i> River .. ..	52,000	400 miles.
Aintas River .. .. .	140,000	400 "
Hartebeest River .. .. .	50,000	270 "
Vaal (including the <i>Hart</i> ) .. ..	55,000	400 "
Black River (commonly called the Orange), including the Caledon }	28,000	400 "
Square miles .. ..	325,000	Extent of Surface of the Hydrogra- phical basin of the Great Orange R.

Of these five, the three first named, though draining three-fourths of the great hydrographical basin, are merely occasional

rivers, with dry channels containing here and there standing pools, and the other two permanent streams, containing sometimes in very dry seasons little more water than a sturdy rivulet. The former are filled by sudden thunderstorms, and come down in immense floods,\* sweeping everything before them. Of the three, perhaps the Hartbeest River, with its broad, level bottom, which receives the drainage of the Sneeuwbergen, carries down the greatest quantity of water; and the two latter (the Black and the Vaal, coming from the high lands of the E., with their fountains, frequent rains and snow) alone cause the channel to remain full for several months, and frequently the whole year. It is remarkable that the Aintas, the junction of which has now for the first time been shown, and the tributaries of which drain the Kalagare wilderness—which I hope yet to explore—though draining a surface of country almost equal to any three of the other valleys, supplies the main trunk with the least water. The mouth of this river was actually not more than about 80 or 90 feet wide when I crossed it. These facts may, perhaps, be ascribed to the prevalence of so many sand-dunes in the neighbourhood of its tributaries. Such sand-dunes are so numerous in the country between the river and the mining locality in Little Namaqualand, that it is difficult to trace the draining-line of a very large valley there.

I have reason to regret that I had not the means of ascertaining the elevations of the various formations alluded to, viz., the sandstone platform of Noup, which I ascended at two points, the waterfall, the junctions of the Aintas and Hartbeest rivers, and the numerous river-terraces, as I should otherwise have been able to append a correct section from the sea to Kuruman.

If, however, my remarks and observations only serve to point out to men better qualified to survey the structure of a country suitable localities in which to examine the varying formations, I shall be able to congratulate myself for having at least made myself useful.

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\* On one occasion (I am informed) in the *Fish River*, Great Namaqualand, so sudden was one of these floods, that a tiger and an antelope which had come down to different standing pools of its channel to drink, were in succession suddenly caught up by it and carried away till entrammelled in a tree, where both could be seen terror-stricken gazing at one another.



V.—*A Coasting Voyage from Mombasa to the Pangani River; Visit to Sultan Kimwere; and Progress of the Expedition into the Interior.* By Captains RICHARD F. BURTON, commanding the East African Expedition, and J. H. SPEKE, F.R.G.S.

. Communicated by the EARL of CLARENDON, Foreign Office.

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## PART I.

ON Monday, the 5th January, 1857, we left Zanzibar in the *Riami*, a small Arab "Beden," commanded by one Nakhoda Hamid of Sur, and manned with a crew picked out of the bazar. Our party consisted of Captain Speke and myself, two Portuguese servants, and Shaykh Saïd bin Salim, a respectable Arab of Zanzibar, commissioned by the Sultan to accompany us. A north-easter blew dead in our teeth: our men would not "wear round" by day, and at night all showed a predilection for the "Safar Khoriyah"—i. e. anchoring in some snug bay. Consequently we did not make Kokotoni, the usual departure point from this island, till the morning of the 8th of January.

Kokotoni, "among the pebbles," is an anchorage about 18 miles from, and nearly due N. of, the town of Zanzibar. Formed by a bight and three low islands, Tumbatu, Manawamaná, and Popo, this roadstead is rendered dangerous during the kaskazi, or N.E. monsoon, by a heavy rolling sea and a coral-bound lee shore. I visited Mwanda, a village at the bottom of the bay, inhabited by Makhadim, a servile tribe of the Sawahili. The country around is, as everywhere in Zanzibar, prodigiously fertile, green and monotonous. Mangrove and an inner belt of jungle line the coast. The interior is a mass of cultivation, manioc and sweet potato, mangos and cocos, limes and oranges, the latter planted as by the Italians, in long rows. The weeds had been burned, a rude manner of manuring, and the peasants were preparing, with ruder implements, the lower grounds to receive paddy as soon as rain might fall. After a long walk we returned on board in a "monoxyle," or boat made out of one tree;—these and the *πλοιαρία* *ῥαπτά*, or small craft sewed together, are still the staple of the coast,—paddled by Tumbatu fishermen, and propelled by a loin cloth acting as sail. Makhadim, like those of the mainland, Tumbatu mariners, are celebrated in these regions. They abound in curious superstitious. Like the Nasamones, who, for insight into futurity, slept upon their ancestral graves, these people pass the night in a cave where an attack of inspiration comes upon them; they are skilful in divination, and at funerals practise a pagan kind of wake, men and women foully abusing the corpse before it





goes to its long home. There is no water upon their low bank of coralline, and their sooty skins testify its heat.

With thunder, lightning, squalls, and heavy showers, which generally fell in the morning, our progress was slow. On the 5th day from Kokotoni, after stumbling over 33 miles, we sighted the southern point of Pemba, the "Green Island" of the Arabs. Chak-Chak, the chief port, fort and town, is situated in a deep inlet on the western side, and the narrowest part of the island: the only settlement of importance, it lies about 25 miles N. of the Southern Cape, and its approach is winding and difficult. Its entrance has that silent, mountainous, melancholy beauty, the beauty of death, which belongs to the creeks and rivers of these regions. The air was pure and sparkling; a light breeze curled the little waves; the sand wherever it appeared was of the purest yellow, creamed over with the whitest of foam; and luxuriant trees of brightest green drooped from their coral ledges over a sea, here deeply azure, there verdigris-coloured by the sun shining upon a shoal. But animated nature was wanting; we heard not a voice, we saw no inhabitant—all was still as a great grave. A chain of islets here forms a complicated approach to a creek, all mangrove below and covered above on both sides with rounded hills, which bear upon their rugged surface the coco and the clove. On a wooded eminence, 4 or 5 miles distant from the creek where we lay, rise the white walls and tall towers of Fort Chak-Chak, standing boldly out from its dark-green background. With the distinctest remembrance of Indian rivers, my companion and I could not but admire this scenery. Next morning early we rowed through a "gate," formed on the right by Ras Kululu, and on the left by a high plantation, Ras Bannani: it led to a broad shallow basin where two or three small Sayas (Arab craft), not wishing to approach the town, rode at anchor. After a couple of hours, during which progress was of the slowest, we entered a narrow channel bounded off by a luxuriant growth of mangrove, the black and fetid ooze that supports these forests of the sea contrasting strangely with the gay green of their foliage. The tide, which hereabouts rises 12 or 13 feet, was then rapidly ebbing: when the water is in, large boats run up under the walls of Chak-Chak; when out, the channel, within several hundred yards of the landing-place, is a quaking bog, in which man sinks up to his waist. We nearly despaired of reaching our destination when a sharp turn showed us the fort almost above our heads. After three hours of constant grounding we disembarked and waded up to the landing-place.

Ascending the hill I was struck, even after Zanzibar, with the wondrous fertility of the country. All that meets the eye is green; cocos, jacks, limes, and pyramidal mangos, grow in clumps upon the rises; the wild egg-plant and castor shrub spread over the uncultivated ridges, and the little fields bear crops of holcus,

mung, thúr, sesamum, chana or "gram," cassava, vetches, and many kinds of greens. The eternal dampness of the air, unfavourable to human, promotes vegetable development, in a luxuriance almost oppressive. After a few minutes' climb we entered the principal street of Chak-Chak, a long narrow lane, formed by square wattle dab-huts raised on platforms of tamped clay; inside consisting of a "but" and a "ben," externally of a deep verandah, where poultry, fruit, and stale fish are exposed for sale.

My first visit was to the Wali or Governor. In his absence I was received by his brother Sulayman, who lay shaking with fever upon his bed. We then took refuge from the sun at the place of Customs, where I was greeted by Pissu, the Banyan, who here collects the government dues. His reception was far more cordial than it would have been in his own land, where Bhattias are by no means renowned for hospitality. He sent for our casks and filled them from a little stream behind the town. This water is superior to the ship supplies, the brackish produce of the sands near the anchorage ground. He gave me mangos, rice, and other provisions, reproached Saïd, the guide, for not landing the night before, and when I took leave of him in the evening, sent me off in his own boat. I determined Pissu to be an exceptional man, but afterwards, on the coast, we received the same civilities from all the Hindu and almost all the Indian merchants. It need scarcely be said that besides the dignity of our companion "Saïd," we were provided by Colonel Hamerton's forethought with letters from the Sultan of Zanzibar, and, better still, perhaps, from Ladha Damha, his collector of Customs.

Pemba is an irregular coralline bank, of the long narrow class, 38 miles from N. to S. and in breadth varying from 2 to 10. It is situated between  $4^{\circ} 52'$  and  $5^{\circ} 30'$  S. latitude, and  $39^{\circ} 40'$  E. longitude. The latter in Owen is  $39^{\circ} 35'$ . Since this time, however, Bombay and the Cape have been placed  $5'$  farther E., and the correction has been generally applied in charts and maps to the African coast. The N.W. point, Ras Kigomathe, nearest to the main, is separated by a channel 18 miles broad. The reefs and shoals, branching northward from the island to a considerable distance, are still unexplored: every ship that sounds makes some discoveries. A strong current runs between Zanzibar and the East coast of Pemba, carrying vessels northwards sometimes at the rate of 50 miles per diem. This mass of verdure, justly called the Green Isle by the Arabs of Yellow Oman, has nought objectionable but climate. As in Egypt and other damp hot lands, no man here is in rude health: laming ulcers on the legs, and painful indigestions, afflict new comers; the small pox is a plague, and the population is decimated by hydrocele and bilious fever.

The fort, situated at the town's extremity, upon a hill commanding the creek and landing-place, is probably built after an old

Portuguese model. A loopholed curtain of masonry, flanked on the right by a large round tower, a mere shell, and on the left by a square turret, penthoused with cadjan mats, forms the frontage. A few iron guns, honeycombed to the core, lie around the walls; the entrance is dilapidated; and the building, now undergoing repairs, is, like most forts in these regions, about as capable of defence as the castled crag of Drachenfels. The garrison consists of twenty Baloch, who live a life of congenial do-nothing-ness. Hearing the people of Pemba call their fort, as at Maskat, "Gurayza," doubtless a corruption of "Igreja," I inquired about Portuguese ruins, and heard of two deserted churches, in one of which a bit of steeple is still standing. The Portuguese long made the Green Isle one of their principal slave depôts: as late as 1822 their ships traded regularly to Chak-Chak. There is nothing to interest in the remnants of their semi-barbarous rule. I did not visit the ruins.

Pemba supplies to Zanzibar a little excellent ghee and poor rice: it grows cocos and cloves, and in common with all the coast exports cowries. This year, articles of consumption, except fowls, are dear. Bullocks reared on the island cost from 6 to 10 dollars, sheep brought from the mainland 3 or 4, and goats, which are rare and dear, from 7 to 9. Fowls are sold at 20 or 23 the riyal, half price of Zanzibar. The ten Banyans who make Pemba their head-quarters, demand high agio for small change, giving only 111 pice for the German crown, whereas 128 is now the rate at the capital. They also regulate the price of provisions according to the Zanzibar market, and keep the gross value of exports and imports, as usual in these regions, a profound secret.

Next morning we set sail. The crew wasted time, hoping to pass a snug sleepy night, anchored in some quiet "Khor." I insisted, however, upon a *δερμας νυχθημερος*, and they obeyed grumbly. Grave misgivings as to the wisdom of such proceedings, however, came over me as the moonless night closed in, and, exaggerated by the dim light of the stars, rose within biscuit-throw the "silhouettes" of islet and flat rock which sent forth the threatening sound of a wash. Presently, emerging from the reefs, we smelt the sea air and felt with pleasure the long throb of the Indian Ocean.

During the three days that followed our patience was sorely tried by all the great discomforts and the small dangers of a cranky old tub, half manned by a useless, careless crew, beating against and often taken aback by half a gale, with a strong current setting the wrong way, a dark angry sea to windward, and a lee-shore of coralline banks and bars. After long gazing at the three hummocks, called by the Portuguese the "Crown of Mombasa," we were not sorry to enter the land-locked harbour,

to cast anchor opposite "English Point," and to pass the quiet night, of which we had disappointed our Arabs at Pemba. Leaving orders with Lakhmidass, the Banyan collector of customs at Mombasa, to land and lodge our luggage, Captain Speke and I set out with dawn on Saturday the 17th of January, to visit the Rev. Mr. Rebmann at Kisulodini, his mission station. A heavy boat, far too heavy indeed for its crew, two men and a small boy, carried us up the channel, or inlet, which bounds the eastern side of Mombasa Islet. Behind, or north of the town, lies "Port Tudor," a salt-water basin about 2 miles broad, and in depth varying from 1 to 15 fathoms. This prolongs itself towards the interior in two tidal arms, the northern named the "water of Wakirunga," and the north-western known as the "water of Rabai," from tribes owning the banks. Captain Owen has christened them respectively "William Creek" and "River Barrette," after officers who aided in his survey. Westward of Mombasa Island is Port Rietz, the counterpart of Port Tudor. It projects a third salt-water arm, called the "water of Doruma" from the region through which it runs, and receiving the "Muache," a sweet rivulet flowing from a spot 20 or 30 miles distant from the coast. Mr. M'Queen's "Tuaca, or Nash River" (Map, 1843) contains two distinct errors. "Tuaca" is confounded with "Mtu Apa," the "River Matwapa" of Captain Owen, a creek north of Mombasa. Moreover the great stream which appears on paper is a mere runnel: the existence of a river would have altered fundamentally the social condition of the whole interior.

We followed the "water of the Rabai," which so strongly resembles the entrance to Chak-Chak that description would be as a tale twice told. After 10 miles rowing and pulling that occupied seven hours, whereas with wind and tide three are ample, we landed at the pier,—a tree projecting over the right bank. Having carried off rudder, sails and oars, to secure the presence of the boat next morning, our land-journey commenced. We began with rolling ground, a narrow footpath crossing an expanse of high, coarse, dry grass, studded with mimosa thorn and other trees. Among them I remarked the "Galol" of Somali-land: it bears a cone like a filbert, hollow inside, with a long sharp thorn at the end, soft whilst young, but when old, dry, hard, and woody. Rolling ground extends to the foot of Rabai Hills, and the short but sharp ascent of a rocky path, at times shaded by clumps of trees, leads to the summit. Here among a little cultivation we found a "lodge" of Wanyika, or the "Desert-people," who tenant these mountains: it is useless to identify their land with the Νικωνος ὄρημος of the *Periplus*, as every wild in this country is called "Nyika." The savages were all armed, being in terror of the Masai plunderers, the natural enemies of their caste. None,

however, had guns, the people of Mombasa strictly forbidding the importation of powder, a wise precaution which might be adopted in the more southern portions of the coast. They received us civilly, with the "Yambo" salutation which recalled dim memories of "Mumbo Jumbo." The road lay under the grateful cover of a little wood, and then over ridgy ground where a scattered village,—it has since been almost depopulated by the Masai spear,—was surrounded by the scantiest cultivation. At the end of a 5 miles walk we entered the Mission House, introduced ourselves, and received from its inmates the kindest welcome.

A subsequent visit to Kisulodini added somewhat to our knowledge of the country. Under different names, as Shimba and others, this range, varying in height from 700 to 1200 feet, fringes the coast from Melinde to Pangani. Distant but a few miles from a shore of shelly coralline, I found no trace of the limestone formation which forms the Somali sea-board. These hills are composed wholly of sandstones, red yellow and dark brown with oxide. The soil, as usual in East Africa, from Zayla to Mozambique, is red, and bits of quartz lie scattered upon the surface.

Above Mombasa the Rabai range is a mere ridge, rising abruptly seawards, with a gentler landward inclination. This probably has given rise to the novel idea of an interior depression in a region bounded n. and s. by rapid rivers, the Adi and Pangani. Its summit is broken into deep ravines, which during the rains pour heavy torrents into the sea-arms at their base. The people might make ample reservoirs by damming the smaller clefts; but they prefer thirst and famine to sweating their brows. Though exposed to the sea-breeze, the land requires nothing but water. We found cocos, mangos, plantains in abundance, papaws and guavas, small custard-apples, the cassava, and the castor-plant. The woods contain, it is said, copal-trees, and the higher hills supply the "mvule," whose huge trunk serves for planking and doors at Zanzibar. A little gum copal or anumi is here dug; but the inveterate indolence of the natives, their rude equality, in which, as among Bushmen, no one commands, and their fondness for "tembú," or palm-wine, are effectual obstacles to progress. When we visited these hills, drought and its consequence, famine, compelled the people to sell their children. Contented with this exertion, they did no more. Shortly after we left Mombasa the wretches were attacked by the Masai, a pastoral horde, from the west, and the terror of this country; their cows were driven off, many were slain, and a party of soldiers sent from the town to defend them lost, it is reported, 25 of their number. As I hope to furnish a separate memoir upon the ethnology of East Africa, the Wanyika and Masai may now be dismissed.

We had proposed a short excursion inland from Mombasa; but



everything was against the project. Indeed it is to be feared that the entrance to Chaga, Kilimanjaro, and the hill country around, will now be closed for many years. Caravans dare not face a contest with professed plunderers, and a successful raid hereabouts always leads to divers repetitions. Such is the normal state of East Africa, from the Red Sea to the Cape. The traveller never can be sure of finding any particular road open to him—a few deaths will shut it for years and stop the explorer at the threshold of his exploration. On the other hand, the merchant commands an entrance for his goods: if one line be closed, another forthwith opens itself. Such we found the case this year at Mombasa. The western country has suddenly been shut to Arabs and Sawahili: the north-western has become as unexpectedly practicable. On the 19th of January returned the van of a large trading party, which had started for the interior in September last. About 200 men—Arabs, Sawahili, and slaves, of whom 150 were armed with muskets—left Mombasa, carrying packs to the value of 300 dollars in “merkani” (American long-cloths or sheetings) and other stuff, beads, knives, brass-wire and small chains, with stores and comforts for the way. After 14 long stages and sleeping out 24 nights, they reached Kitui, the farthest point visited by the Rev. Dr. Krapf in 1849; thence they dispersed through Kikui and Ukambani to purchase ivory. The latter article sold per frasilah of 35 lbs., for 88 cubits of cotton cloth, worth probably 11 German crowns at Zanzibar. A small merchant brought back from 1400 to 1500 lbs. I wrote down a list of their stations and marches, carefully comparing the accounts of several travellers. Ukambani was described to me as a country rich in game, with gazelles, “wild camels” (giraffes), and buffalo in the plains; hippopotamus in the rivers; rhinoceros (which the Arabs here call “el Zurráf”) and elephants, lions and leopards, in the jungle. The tribes are subject to headmen, whose influence extends over a few miles: these must be propitiated with cloth and beads, and travellers receive provisions in return for their presents. At Kikui they found a powerful chief, Mundu Wazeli, whose magical powers were held in great awe. The people, a semi-pastoral race, escort travellers, and appear hospitable: they are braver than the Wanyika, and effectually oppose the Masai when invading the country to drive off the Galla cattle. Water abounds, the climate is good, and provisions are cheap. The honey is “white as paper;” sugar-canes, cassava, holcus, and tobacco, are everywhere cultivated by the women; fowls are cheap, goats cost 8 and cows 24 cubits of long cloth. The beasts of burden are asses and a few camels. Their return road was rendered dangerous by the Gallas, who, however, did not dare to attack so large and well-armed a body. Every night they surrounded themselves with a rude abattis, and

lighted fires against wild beasts. I did not hear that any of the party perished. My informant could tell me nothing about the "giant snow-mountain Ndur-Kenia," the volcano 6° distant from the sea, the Tumbiri or Monkey River flowing to the N.W., and the other geographical wonders detailed in late years. Yet these Arabs were acute and not incurious men: one of them, Mohammed bin Ahmed, had kept a journal of his march, noting down the several stages and distances.

Nothing, even among the Bedouin Somal, can be wilder than the specimens from Ukambani, whom I saw dancing in the streets of Mombasa. About 50 blacks, dyed with ochre, were performing the zumo or procession, men blowing kudu (coudou) horns or firing their muskets, and wild women, screaming after the fashion, called "zagharit" in Egypt, here "vigelegele." The warriors were armed with the usual poisoned arrows and long bows, spears, knobsticks, knives and sword, a rude imitation of the straight Oman blade; some had shock-heads of a hair fit for door-mats, others had twisted it into a hundred little corkscrews; their eyes were wild and staring, their voices loud and barking, and all their gestures denoted the "noble savage" who had run out of his woods for the first time: they were, however, in exceeding good humour. Before the last year no Arab had visited their country—trading-parties from Ukambani sold to the Wanyika, who, after fleecing those more savage than themselves, retailed their goods to the citizens. The Wakamba of the coast are, of course, anxious to promote intercourse between Mombasa and their kinsmen of the interior: thus a road first opened at the imminent risk of life, by the enterprising Dr. Krapf, now bids fair to become a highway into the interior of Eastern Intertropical Africa—a region full of varied interest. But let not geographers indulge in golden visions of the future! Some day the Arabs of Mombasa will seize and sell a caravan, or the fierce Gallas will prevail against it. Briefly, no spirit of prophecy is required to foresee that the Kikui line will share the fate of many others.

We found in the people of Mombasa by no means the most friendly inclinations. They are justly taxed with pride, bigotry, evil-speaking, insolence, turbulence, and treachery by other Arabs, and they are too far from Zanzibar for rigid control. The jemadar or fort commandant, "Tangai," a gaunt old Mekrani, who commands about 300 men, could do nothing but beg for our guns and pistols: a little cloth, powder, and a gold chronometer would have been acceptable to his worthy son. With the governor, Khalfan bin Ali, an Arab of noble family from Oman, we were on the best of terms. The Arabs and Sawahili generally appeared to regard us as man regards his rival—viciously: the terrors of the interior were studiously exaggerated, and throughout their discourse

lies were plentiful as pronouns. We lost no time in making inquiries about the different points of interest to us, and, theta sk coneluded, set sail with gladdened hearts on the morning of the 24th of January.

The conditions of our voyage were changed, wind and a counter current—running 30 and 35 miles a day—now being both in our favour. At 2 P.M. we made Gasi, a village of Mazrui Arabs driven from Mombasa by the late Sayyid Sâid. It lies half way between the former port and Wasin Island.

The position is correctly laid down in the Mission map. Gasi is an open roadstead, without other protection against the unbroken sweep of the Indian Ocean than a few scattered "washes" and a coralline islet. Concealed by a screen of mangroves, and betrayed by cocos, sure indicators of man's presence in East Africa, lies the settlement, a large village of mud huts. It is surrounded by plantations, and the inhabitants, unmolested by the Wadigo savages to whom the land belongs, live in comparative comfort.

Having passed a cool breezy night on board the *Riami*, at sunrise we made sail, and in three hours entered the passage which separates Wasin Island from the main. This channel runs due E. and W., is 2 miles long by 1 broad, and has never less than 5 fathoms of water. The north of the island is defended by diminutive coralline cliffs, against which the open sea breaks with violence. The southern shore is low and rich in "floatsom and jetsom." Here the tide flowing among clumps of mangroves, forms little bays by no means unpicturesque. To windward lies the Wasin Bank with 4 or 5 plateaux of tree-tufted rock, emerging a few feet from the waves.

The island, which belongs to Zanzibar, is a coralline bank about 2½ miles in length by one in breadth. The rock is thinly veiled on the leeward side by a red argillaceous soil, which produces a thiek growth of thorn-plants, ereepers, parasites, and jungle trees. Eastward, where the mould is deeper, there is a screen of high vegetation, and even some stunted coeos. Water must be brought from the mainland; it is braekish, but not unwholesome. The climate, however, is hot, damp, and malarious; the inhabitants, destitute of comforts and conveniencées, suffer severely from fevers, sores, and small-pox. They are a bigoted, jealous, and evil-minded race, a mixture of lymphatic Arabs, hideous Sawahili, ignoble half-castes, and thieving slaves. No Banyars make this place their home. A young Cuteli Bohrah manages the custom-house, and we found a small trader of the same caste purchasing the cowries, which, drying in every yard, poisoned the air. All were unarmed, and, the Indians excepted, received us with niggard civility.

The only settlement is built upon the northern shore, about

the centre of the island's length. It is composed of stone and lime mosques—long rooms with flat roofs—scattered among little huts and large houses of mangrove-timber, popularly called Zanzibar rafters. The trunks of trees are tied together with coir rope, plastered with mud, and in some cases adorned with white-wash: the sloping thatched roof is of a magnitude approaching the Madagascar type. Huge calabashes, some of them 40 and 45 feet in girth, spread their fleshy arms over the hovels, affording the favourite luxury of a cool seat, and giving a pleasant village air to the squalid settlement.

The coast opposite Wasin Island is concealed by a thick hedge of verdure, above which nod the tufts of a few cocos: its background is the rocky wall of Bondei, here and there broken by lofty blue cones. Northwards rise two high hummocks, called the "Peaks of Wasin," a conspicuous sea-mark for the voyage. This land belongs to the Wadigo, who, with their southern neighbours, the Wasegeju, are porters of the inland traffic. Trading parties, sometimes a hundred in number each, slaves included, set out at the beginning of the rainy season, March or April, from Wanga, and the other little "Bunders" on the coast. If the capital be 1000 German crowns they take 400 worth of beads, iron and brass wires (Nos. 7 and 8), and 400 of American sheeting, with stuffs of sorts; the remainder serves as pay for 40 porters, who receive 10 dollars per trip, 5 before starting, the other half after return. These caravans, if they may be so called, arrive in 20 days at the Masai and Wakuafi countries, remain trading there for three or four months, and return laden with ivory and a few slaves purchased en route.

Our Nakhoda of the *Riami* again showed symptoms of "dodging." He was anxious to spend another day at Wasin; but the will of Japhet was, as ordinarily, firmer than that of Shem. At 1 P.M., on the 26th of January, we drew in our ground-tackle, flirted with some reefs, and floated into the open sea, where combing waves were foaming under a stiff north-easter. After 2 hours of brisk sailing we were abreast of Jongoliani, a deep bay, with a prominent headland and a garnishing of little islands. A few miles nearer to Tanga than to Wasin, it is correctly placed and incorrectly delineated in the Mission map. We shortened sail when we approached Tanga, or we might have made it at 4 P.M. The sea had fallen under the lee shore of Pemba Island, but as the entrance is considered intricate, and we had no pilot, the crew preferred hobbling in under a jib, which they took a good hour to hoist. After 5 P.M. we threaded the narrow rock-bound passage which separates Tanga Island from Rashid Point, on the mainland; ran into the bay and anchored in 3 fathoms, opposite, and about  $\frac{1}{2}$  a mile from, the town. •

Tanga Bay is placed by Captain Owen in s. lat.  $4^{\circ} 35'$ , a few miles north of Wasin Island. It is about  $5^{\circ}$  s. lat., south of Wasin, and between that place and Pangani. How this extraordinary error could have crept in is an enigma to me. The bay from E. to W., 6 miles deep by 5 in breadth, is partially defended by a coralline bank, formerly the site of Tanga town. This islet still contains a small square stone fort and scattered huts: it is well wooded, but the water obtained by digging in the sand is more than brackish. As a breakwater during the N.E. monsoon it is inefficient, and when a high sea rolls up vessels must anchor close to the mainland. The bay receives the contents of two small streams, north westward ( $355^{\circ}$ ) the Mtu Mvoni or Kibokoni "Hippopotamus River," and westward ( $311^{\circ}$ ) the Utofu. The former, at several miles distance from its mouth, must be crossed in a ferry; it affords sweet water, but the people of Tanga prefer scratching into their sand to the trouble of fetching the pure element.

Tanga, like all settlements in this part of the coast, is a patch of thatched, pent-shaped huts, built in a straggling grove of cocos and calabashes. It numbers between 4000 and 5000 souls; 20 Banyans and a garrison of 15 Baloch, with the customary Jemadar. The country around is fertile, a hard red and yellow clay, producing in plenty cassava, wild toddy-palms,—their Indian use is not known—plantains and papaws, holcus and sesamum, castor and wild egg-plants. When we visited it, however, all was dry as Arabian sand, the fields were burnt, and the owners dawdled about in hourly expectation of rain. Of late years it has been spared by the Masai, who have driven from it many a herd; consequently it is now, comparatively speaking, thickly inhabited, and surrounded by flourishing villages; Mvoni, Amboni, Jangani and others. We were here received by the people and their Diwans or chiefs with peculiar cordiality.

Arab colonies must have been planted at an early epoch in this part of the Sawahil. About 4 miles south of Tanga, half-way on the Tangata road, I was shown the remains of an ancient settlement, now known as Changa Ndumi. It is a parallelogram, 200 yards long, of high and solid coralline wall, loopholed for musketry, bastioned, and in places split by large old trees. The site is raised considerably above the country, attesting its antiquity, and at high tides it becomes an island. In the centre is the Mosque, dilapidated, but still showing vestiges of a rude art, at which the moderns wonder. I was shown with some pretension a legend which proved to be the name of some lettered Sawahili, scratched upon a stucco column in the rudest Arabic character. The ruins of houses are scattered over the "enceinte," and a masonry well, 8 feet deep, yields a sufficient supply of earthy water; the cadjan

huts of a few Wasegeju savages tell the present degeneration of the land. In a modern village, built upon the neighbouring creek, I was shown another old well, 8 feet deep, bone-dry and well plastered. None of the present tenants could relate a tradition of the ruins; the Arabs who accompanied me, declared that they belonged to the "old ancient" Yurabi, the dynasty preceding the present rulers of Oman.

The people of Tanga hold at Amboni, every 5 days, a "Golio" or market with the savages of the interior. On the 29th January I went in an Arab dress to inspect the scene. Having followed the coast for two miles, we crossed some muddy creeks, waded over an inlet, and forded the small stream Utofu. Another mile brought us to the river Mvoni, here called Zigi—two names in 3 miles, after a truly African fashion! It was salted by the tide and flows under banks 40 or 50 feet high, crowned with calabash and other jungle trees. Crossing by a ferry, and passing through coco plantations, we ascended a steep hill and found the market "warm," as orientals say, upon its seaward slope. All Tanga was here. The wild people, Washenzi, Wasunbara, Wadigo and Wasegeju, were clothed in greasy hides, and cotton wrappers of inveterate grime; every man carried his bow and arrows, club, sword and shield, but few had muskets. Some, I remarked, shouldered low wooden stools—sitting upon the damp ground in these regions causes dysentery—and not a few rested upon the long stick whose little terminating cross is used as a churn-staff to mix their blood and milk. The women were more numerous, and harder worked; besides the baby tied in a bundle to the back,—its round head nodding with every motion of the mother,—they carried heavy loads of saleable stuff, and paid toll at a spot where the road was corded across. Here the Bedouins exchange their sheep and goats, cocos, grain and ghee, for white and blue cottons, beads, and rude iron-ware (knives, bills and hatchets, worked on the coast with metal brought from Zanzibar); fish, salt, and "tembú," or coco-toddy, together with such luxuries as spices, needles and thread, bluestone and fish-hooks. Formerly a large quantity of ivory found its way to the "golio;" now it is purchased in the interior by trading parties. The groups gathered under the several trees were noisy, but peaceful. Often, however, a lively scene worthy of Donnybrook in its palmiest days takes place; knobstick and dagger being here used by the factions, freely as fists and shillelah are in civilized lands. We returned at noon; the heat of the ground made my bare-footed companions run forward to the shade, from time to time, like the dogs in Tibet.

Traders from Tanga visit the Masai and Wakuati countries twice a-year; in May and June, and in October and November, after the great and little rains. At such times they find on the way an

abundance of water ; the land, however, supplies no food. From Tanga to Mhináni \* (in Herr Petermann's map "*Mikihani*"), on the Pangani River, passing through Mbaramo and Pare, are 10 long days' march ; here the road divides, one branch leading northward to Chaga, the other westward to the Masai country. These caravans are seldom short of 400 or 500 men ; Arabs, Sawahili, slaves and Pagazi or porters, who will carry 50 lbs. each. The staples of traffic are beads, cotton-stuffs and wire ; the return trade is comprised in asses and camels, a few slaves, and ivory, of which, I was told, 70,000 lbs., an almost incredible quantity, are annually brought to Tanga. I may here remark that all my native informants testify to the intense cold of Chaga and Kilimanjaro. The coast people, who spoke from hearsay, mixed up their information with odds and ends of marvel, too gross even for Herodotus. Actual travellers described the much vexed Æthiopic Olympus soberly and, I should say, correctly.

It has been mentioned that we were hospitably received at Tanga. A "*Ngoma khu*," or big band, consisting of three huge drums, a flageolet, and the upatu, a brass pan peculiar to grand occasions, serenaded us the first evening. The Arab governor being at Zanzibar, we were welcomed by the diwans or sultans (Sawahili headmen)—who hereabouts are in the proportion of half a dozen per village—with gifts of goats, fruits, and a bullock. They accompanied me on my various excursions, and when we went out shooting our difficulty was to shirk an escort. These diwans are respected by the vulgar, who may not sit on chairs or cartels, use umbrellas, or wear turbans before them ; moreover, none but the chief must dance on solemn occasions. The people of Tanga are by no means a comely race, but they are in better condition and healthier than those of Wasin. I saw amongst them a single Albino, and many cases of white leprous spots on the soles and palms.

Sundry excursions delayed us six days at Tanga. At 5 A.M. on the 2nd of February we drifted out to sea under the influence of the Barri, or land-breeze. After five hours of drowsy sailing we reached Mtangata, an anchorage between Tanga and Pangani. Open to the N.E. wind, and imperfectly defended by two distant islands, Yambe and Karangu, the long roll of the Indian Ocean renders it a place of trembling to the coast sailors. The country is fertile, and a line of villages skirts the shore. According to local tradition, which pretends to discover tombs at the bottom of the sea, this bay was once solid ground, the site of a flourishing city encroached upon by the wave. The existing settlements are probably modern : none of them appear in Captain Owen's charts.

\* Mhináni would mean the "*River of Henna*," in this country called Mhiná, or Mhinna.

We delayed a day at Mtangata to inspect some ruins where I had been promised Persian inscriptions and other curiosities.

After grounding for an hour at every ten yards in our little canoe, we left the creek, entered a narrow inlet of mud and mangrove, landed at a village called Tongoni, followed the shore for a few paces, and then, turning abruptly to the left, presently reached the ruins. A city was once here. The old mosques are spacious and well built, with columns of neatly cut coralline blocks, and all display elaborate mihrabs or arches. Remains of houses everywhere cumber the ground. In an extensive cemetery we found the grave of a wali, a saint whose very name had perished, covered with a cadjan roof, cleanly swept, sprinkled, and garnished with a red and white flag. Other tombs were shown with cacophonous Sawahili appellations, embahned in mortally bad Arabic epitaphs; the oldest numbered about 200 years. The principal mausolea had each its tall pillar of cut coralline, denoting, like the Egyptian shahadah, the position of the corpse's head. In one of these, the gem of the place, was fixed a fragment of Persian glazed tile, with large azure letters in the character called Rukaa رُقَاع, enamelled on a dirty yellow ground. The legend was شید روشن, which is probably (Khur-) shid i raushan—"the bright sun," and may be part of a panegyric or devotional verse, removed from the frieze of some mosque or tomb. The people of the country held it an irrefragable proof that the men of Ajein once ruled in Tongoni. But the tile was evidently—like the two China platters also mortared into the shahadah—an importation. It was regarded with superstitious reverence by the Sawahili, who informed me that Kimwere, king of Usumbara, had sent a party of bold men to carry it away. Of these nineteen died mysterious deaths, and the tile was then returned to its place. However, a few dollars had a wonderful effect upon their fancies; we were allowed to remove it, though no one would aid the Beni Nar, "Sons of Fire," as the Arabs honourably term our countrymen. The chief diwan, who had accorded permission, begged me to return and to aid them in digging for water: their present supply, he declared, was scanty and nauseous. In the ruined city four or five carefully-built old wells exist, but all are exhausted by age. As a rule, these people readily apply to Europeans for assistance in finding water: such is their opinion of the "Wazungu," or wise men; and if rain accompany the traveller, he is looked upon as a beneficent being, not without a suspicion of white magic.

At 5 A.M. on the 3rd of February we hoisted sail and ran down with the bright morning breeze to Pangani, sighting Maziri Island after three hours' work. Arrived at a place



which we intended to make our starting-point into the interior, I at once sent Shaykh Saïd on shore, with my letters to the jemadar and wali (commandant and governor), to the custom-house master and the different diwans; my companion and I landed with our servant and luggage in the cool of the afternoon. We were received with high honour. The diwans danced before us with the pomp and circumstance of drawn swords, whilst a bare-headed slave girl sang, and a crowd of negroes and half-castes stood enjoying the vile squeak of the fifes and the discordant sound of the monstrous drums. After half an hour of this purgatory we entered the wali's house, and found the upper rooms, or rather room, ready for our reception. A long conversation with the jemadar, a consumptive little Baloch, and the governor, a freed man of the late Sayyid Saïd, ended the eventful day.

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## PART II.

*A Visit to Sultan Kimwera.* By Captain RICHARD F. BURTON.

PANGANI, "in the hole," and its neighbour, Kumba, hug the left or northern bank of the river; the position is a strip of flat shore, bounded by the sea and a hill range 10 or 11 miles distant. Opposite are Bweni and Mzimo Mpia, small villages built under high cliffs of yellow sandstone, precipitous, and impenetrably covered with wild trees. The river which separates these rival couples of settlements may be here 200 yards broad; the channel at the mouth is from 7 to 8 feet deep; none therefore but country craft, as some of our enterprising compatriots have discovered to their cost, can enter it. Pangani Bay is known by a "verdurous wall" of cocos, and by "diabolitos," or small detached rocks rising from the sea. Northward, by Maziri Island, a green-capped patch of golden sand bearing s.e., and, southwards, by the yellow cliffs of Bweni. It is intricate with reefs and shoals; even our Suri nakhoda expended a dollar upon a pilot. At low water the bed is partly dry; during the rains it is filled by freshes; whilst the tide flows its produce is salt, but when heavy and continued showers fall in the hills it is almost potable. Small vessels lie snugly in the river opposite the town.

Pangani, with the three other villages, may contain a total of 4000 inhabitants, a large proportion being female slaves. It boasts of nineteen or twenty stone-houses, the rest are the usual cadjan huts, each with its large mat-encircled courtyard, where almost all the business of life is transacted. The settlement is surrounded by a thick, thorny jungle; this the people call their fort, fleeing to it for refuge when pursued; it is however full of leopards as the stream is of alligators, and at times they commit

great ravages. A slave-girl, we were told, was carried off from the roof of the Wali's house, and, whilst we were there, a boy was devoured in the river. Plantains, arecas, and cocos grow in the town; around are betel, papaws, and the jamli, an Indian fruit, and in the vicinity, extensive shambas or plantations of holcus, maize, sesamum, and other grains; cloves thrive, and, as everywhere upon the coast, a little cotton is raised for household purposes. The climate has the name of being healthy, but the water of the wells is heavy and brackish, and the long wet monsoon is rich in fevers. Animals are rare. Cows die after eating the grass; goats, not being of the civilized species, give a little milk only after yeaning, and sheep are scarcely to be found. But fish, as well as poultry, are abundant, and before the late feuds began, clarified butter, that "one sauce" of the East, was cheap and plentiful. Made in the interior by the Wazegura and others, with fine cows' milk, put into clean vessels, and sold when fresh, it reminded me of the Jaferabadi Ghee so celebrated in Western India.

Pangani has had, until this year, a thriving commerce with the Nguru, Chaga, and Masai countries; twenty Banyans here find a livelihood. Trading-parties travel at all seasons, except the rainy monsoon, when they find it difficult to cross the river's upper stream. As many as 1000 Sawahili and slaves, directed by a few Arabs, set out, laden with iron and brass wires (Nos. 7 and 8), small brass chains, which, fastened together, are formed into kilts by the Masai, American domestics, indigos, and cheques, together with beads of sorts, especially white and blue. Each man carries a pack worth about 15 German crowns; consequently, the venture is of 3000*l*. They reach their ground in twenty days, and return after a period varying from two to six months, laden with ivory, rhinoceros horn, and hippopotamus teeth; a few slaves complete the export traffic of the interior. The Banyans complain loudly of their Pagazi or porters; these fellows are paid 10 dollars for the trip, half in ready money, the remainder upon return, and the merchant congratulates himself, if, after payment, only 15 per cent. abscond. The Hindu's profit however is here doubtless great. I have heard of one to whom 26,000 dollars were owed by the people:—interest and compound interest must occupy a large share of such a sum in a place where even Europeans lend money at 40 per cent. on mortgage or bottomry. Some of their gains are swallowed up by the rapacity of the savages, whose very princes are beggars. The pliant Banyan always avoids refusing: he will consequently find at his door every evening seventy or eighty suitors for butter, grain, or a little oil. Besides Zanzibar rafters, which are cut in the river, holcus, maize, and ghec, Pangani, I am told, sends annually to Zanzibar 35,000 lbs. of ivory, the

finest and largest in the world, 1750 of black rhinoceros horn, and 160 of hippopotamus teeth.

After the dancing ceremony a variety of difficulties began.

Pangani, Bweni, and the other settlements on this coast, belong, by succession, to the Sultan or reigning prince at Zanzibar, who confirms and invests the governor and diwans. These officials, however, are chosen at Pangani by Kimwere, Sultan of Usumbara, whose ancestors received tribute and allegiance. Bweni, on the other hand, is in the territory of the Wazegura savages, a violent and turbulent race, thoughtlessly allowed by the rulers of Zanzibar to arm themselves with muskets, and to store up quantities of gunpowder; of course, the two distinct races, Wusumbara and Wazegura, are at enmity, and, being so, there is no thoroughfare for travellers. Moreover, violent intestine feuds having broken out, the Wazegura were, at the time of our visit, burning and murdering, kidnapping and selling in all directions. The people of Pangani, therefore, hearing that we were bearers of a letter from Sultan Majid of Zanzibar to Sultan Kimwere of Usumbara, determined that we should follow the circuitous route, *via* Mtangata, where no Wazegura could let or injure them. We, on the other hand, wishing to inspect the Pangani River, resolved to travel by the most direct line along its northern bank. The timid townsmen had also heard a report that we were bound for Chaga and Kilimanjaro, the Masai were "out," the rainy season was coming on, and they saw with us no armed escort. They then resolved not to accompany us, but still each man expected a bribe of inducement. Muinyi Khatib, the eldest son and heir of Sultan Kimwere, sent a presuming message, directing us to give him what we had brought for his father. We declined in the same tone. The dancing Diwans *demand*ed a fee for permission to reside. We showed our letters and threatened them with a reference at Zanzibar. Briefly, all began to beg "Bakhshish," but I cannot remember that any one obtained it.

Weary of importunity, we suddenly resolved to visit Chogwe, the nearest outpost of the Baloch garrison, and thence to push on for Fuga, the capital village of Usumbara. We made preparations secretly, left Saïd bin Salim with our property, pretending a shooting excursion for a few days, hired a large canoe, and at 11 A.M. on the 6th of February started up the "buffing stream." The field-book and map of our route, herewith appended, will render it unnecessary to notice anything beyond the generalities and adventures of our route.

From Pangani to Chogwe,—“the bazar,”—by the river is a distance of 13·5 miles. Near the sea, when wind and tide meet current, its navigation is dangerous, and many small craft have filled and sunk beneath the short chopping waves. It is impossible to

avoid being taken aback, so abrupt are the turns of the river, and the water acts well as a wind conductor. About 5 miles from the sea we found the Pangani but slightly brackish, and a little farther up, sweet as the celebrated "creek water" of Guiana. The scenery at the mouth is that of sandstone districts, amene and diversified: its soft beauty however bears the blight of death. On both banks are traces of man's presence—the homestead blackened with fire; sugar-cane, plantains, and bitter mangos almost choked with wild growth, and arecas and cocos towering over a now impenetrable jungle. The river abounds in fish, to judge from the style of capture, an old wife's shoulder-cloth, a rude crate, or a coarse weir planted in the mud. Where we visited it, three small Arab timber-craft were laying in a cargo of red and white mangrove trunks, and in many places there floated small rafts of wild coco fronds ready to be guided down the stream. At sunset the tide began to run out like a sluice; and we halted at Pombui, a small village on the left bank, well stockaded with split arecas. Shortly after midnight we again rowed up the dark silent waters for two hours, when reaching the "ghaut" of Chogwe, we made fast the canoe and lay down to sleep.

We began the next morning with an inspection of Chogwe, to which we were escorted with sundry discharges of matchlocks by the jemadar. This outpost was occupied about five years ago, when the Rev. Dr. Krapf,—unhappiest of political divines!—discovered and published in the 'Church Missionary Intelligencer,' "that his journey to Usumbara had brought to light a fact; namely, that the Imam of Zanzibar has not one inch of ground between the Island of Wassin and the Pangani River." The Rev. gentleman's fact proved to be the purest fiction. His late Highness Sayyid Saïd of Zanzibar, with his wonted benevolence and moderation, pardoned an interference which had nearly produced most regrettable consequences, and at once garrisoned Chogwe and Tongwe with 25 Baloch. The former outpost is situated upon an eminence, rising from the grassy plain of black earth which is overflowed during the rains. It is 7 miles distant from Pangani, and its direction is 288°. A stout snake-fence contains the cadjan pent-houses of the Bashli-Buzuk garrison: its fortifications are two platforms for matchlock-men, planted on high poles like the Indian "Méchan." It is exposed to the attacks of the Washenzi "savages," who sometimes at night creep up to the huts, shoot a few arrows or set fire to the melting, and hurriedly levant. About 15 miles west of Chogwe (233° 15'), in the plain of the Wazegura, south of the river, rises the detached hill, "Tongwe Mwanapiro," belonging to one Mweri, a chief hostile to the Baloch. The latter, if fifty in number, could easily "loot" the whole country: they suffer however at all

times severely from sickness, and appear dull as a whaler's crew. The position of Chogwe is badly chosen, water is distant, the soil is rugged, and it is within reach of the river miasma. It commands, however, the southern Usumbara road, and thus affords opportunity for something in the "looting" line.

Having communicated our project to the Jemadar, he promised all aid, told us that we should march the next day, and, curious to say, kept his word.

Our luggage was now reduced to the lowest expression. For instruments we carried sextant and horizon, two compasses and stand, a common and a boiling-point thermometer: a waterproof carpet-bag contained pens, with journal and drawing materials. Our arms were two daggers and three swords, a "six shooter" each, a Colt's revolving rifle, a small German "büchse," and a shot gun, in fact fighting kit, with the ammunition necessary for ourselves and men. A solid leather portmanteau was stuffed with a change of raiment and a present for Sultan Kimwere, namely, a black cloth coat (12 dollars), eight sprigged muslin turbans (8 dollars), eight Surat embroidered caps (8 dollars), and two bright-coloured cotton shawls, of small value. We had a few extra muslins and caps as gifts to chiefs, and a dozen German crowns which were useless. Our provisions consisted of three bags of rice (12½ dollars), onions, cassava flour, a sack of dates (2½ dollars), tea and sugar for ten days, tobacco, pepper, and salt, of which none is procurable in the interior, a lamb, three fowls, and a bottle of cognac. Our beds were in waterproofs, which might also be used as tents; a horn-lantern, wax candles, and a policeman's dark lantern were added for night work, and a portable tin canteen with a patent digester completed the equipment. This is indeed light marching order: the little settlement, however, could afford us nothing but four slave-boys, a guide and his attendant, hired for 10 dollars, and a guard of five matchlockmen. A start was effected with infinite trouble, every one complaining of his load, snatching up the lightest article and hastening forward. This nuisance continued till summarily stopped by an external application easily divined. At 5 p.m., accompanied, in token of honour, by the Jemadar and most of his men, we started for Tongwe.

The path began over rugged stony ground: at 6 it plunged into a dense thorny jungle, which, during the rains, must be almost impassable. The belling of deer and the "clock, clock" of partridge struck our ears: in the open places were the dry lessees and footprints of elephants retained by the last year's mud. These animals descend to the plains during the wet monsoon, and in summer retire to the hilly interior. We were not fortunate enough to meet with a single specimen, but to judge from the

prints, two circumferences of the foot usually showing the height of the shoulder, there is nothing remarkable in the size. Game is rare throughout this track. None will live where the land is peopled: in the desert they are persecuted by the Baloch and wild huntsmen, who slay and eat even the rats. We heard, however, of mbogo or wild buffalo, antelope, and a curious hog, probably the masked boar, lions, leopards in plenty, and an elk somewhat resembling the Indian "Sambar."

Another hour's marching brought us to the Makam Sayyid na Sulayman, a cleared place in the thorn jungle, bounded by a rocky and tree-fringed ravine, where water stagnates in pools, and where at times game is found. The pedometer showed 6 miles. There we passed the night listening to well-remembered Baloch lays of love and war, slapping away "mammoth mosquitoes" that flocked to the camp fires, and anon rising to get rid of a huge black pismire, whose bite burned like a red-hot needle. During the hours of darkness, two parties of savages, armed with bows and arrows, passed amongst us, carrying maize to Pangani. The Baloch kept a truly Asiatic watch, singing and shouting during the early night when there is no danger, and sleeping like the dead through the "small hours," the invariable time of assault.

At daybreak on Friday the 9th we resumed our march, having taken leave of the *poitrinaire* Jemadar, who could no longer walk. An hour's hard labour brought us to the fort of rugged Tongwe, the "great hill." Ascending the flank of the s.e. spur, we found ourselves at 8 A.M., after a 5 bad miles, upon the chain of a lower ridge with summer towards the sea and landward a wind of winter. Ascending the chain, in another half-hour we entered the small, square, crenellated, flat-roofed, and white-washed room, which here acts as a fort. It was built about 4 years ago, when this hill, deserted on account of Wazegura incursions, was offered with cheap generosity by Sultan Kimwere, as a mission station to Dr. Krapf.

Tongwe is the first buttress of the mountain-region which composes the kingdom of Usumbara, the threshold of the Chaga and Masai Highlands. The maritime portion of this tract is called by the people "Mrima," or "the mountain," a word at Zanzibar denoting the mainland generally, in distinction to the island. Its diminutive form is "Kilima," also synonymous with the French "Mont" in composition, and applied to any small protuberance as the boss of a shield: it enters into many East African proper names, as Kilimanjaro, the great mountain, Kilimani (Quilimane Riv.), "near the mountain," and Wakilima or Waki-  
rima, according to dialect, "the mountain people." Tongwe is 324°, and 9 miles distant in direct line from Chogwe. The descent towards the river is impassable: the summit, about 200 feet above

the level of the sea, is clothed with jungle, through which, in search of compass sights, we cut a way with our swords. The deserted ground showed signs of former habitations, and a negro who accompanied us remarked with a sigh, that his kinsmen had been driven from their own ancient seats into the interior. Tongwe projects spurs far into the plain: the river flows through a trough of rock in its lowest slopes, and the noise of its falls may be heard, it is said, at times from the fort. The surface of the mountain is a reddish, vegetable and argillaceous soil, overlying grey and ruddy granite and schist: the mica has often been mistaken for gold by the Baloch. The thickness of the jungle, which contains stunted cocos and bitter oranges, proves the fertility of the soil; the castor-plant, wild benzoin and bird pepper, flourish on the slopes, and around the fort are small plantations of manioc and maize. A deep hole in the northern flank abundantly supplies the purest water, and, below the hill, two springs are found curiously placed in a block of well-weathered granite, 20 feet high, and striped with lines of snowy quartz. The climate must be excellent; surrounded by the blaze of an African mid-summer we found it neither hot nor cold. But the lower lands are burned like bread crust: the "fertile and flourishing regions about Tongwe" belong to the category of things gone by.

Next morning saw us on foot betimes, yet it was 6 A.M. before the knotty question of portage was duly settled, and we were free to follow the thorny goat track which leads down the N.E. spur of Mount Tongwe. By dint of wandering through rushes and tiger-grass we struck into the Pangani road, and after 3 hours' walking, halted to rest at some fetid pools. Muinyi Wazira, our purblind guide, who doubtless had his reasons, induced us to advance by promising better water ahead. The way was over stony ground, rough red ridges, broken by narrow green valleys, or rather ravines, which showed signs of inundation during rain. But the Kazkazi had dried up the marrow of the land, and though we searched *secundum artem* we found no water. An apparently interminable series of wearisome mountainous slopes, traversed by a stony, dusty path, lay before us, the cool sea breeze had no business there, and the sun stung us with his fiery beams. Presently the men began to drop off. Our guide, treacherous as a Sawahili, and the four slaves spent the sultry hours at some pool which they had discovered, and wisely kept to themselves. We sought the imperfect shade of a tree, and our Baloch threw themselves under bushes in all directions.

At 4 P.M. we resumed our march. The guide, who had now joined us, again giving the lead to Shaaban, an old Mekrani, whose five wits were absorbed in the thought of water, caused Captain Speke to miss the road: I kept my companion in sight, whilst our

other men straggled far behind. Shortly after sunset we reached a narrow fiumara where stood, delicious sight! three puddles bright with chick-weed, and black with the mire below. After quenching our thirst, it became evident that we had lost the way, our shouts and shots remained unanswered, and it was useless to thread the thorns by the uncertain light of the moon. We kindled a fire, looked to our arms, remembering certain ominous growls which we had heard in the morning, lay down upon a soft place, and certain that Shaaban would be watchful as a vestal virgin, slept. The day's work had been 16 miles: they appeared 30.

Early next morning we retraced our steps, and presently came upon the rest of our people: they had followed the upper or northern road, and had encamped near the higher bed of the same fiumara which had given us shelter. The "Nyuzi" is a rocky bed, about 20 feet broad, edged with thick trees and showing a violent torrent during the wet monsoon. Even in the driest seasons pools sometimes 100 feet long abound, and, by digging in the mud, water is always procurable. It falls into the Pangani, proving a southerly slope of country, drains the hills, and shelters the only game to be found in the vicinity.

After receiving many congratulations and finding everything in order,—the sole accident of the night was a small stab administered by a Baloch to a slave by way of bringing him to a sense of his duty,—we rested till 3.15 p.m. in the grateful shade. Our human cattle then loaded one another and advanced in Indian file, over a path dented by the wild buffalo's hoof; the country around was a straggling thorn jungle, the dry grass had been fired to promote a green growth of fodder, "black-jacks" dotted the rolling ground, and ant-hills, like the "fairy-mounts" of Ireland, arose regularly as if disposed by art. It is needless to say that all was desert. Khombora's cone fell behind us, the blue walls of Sagama became brown and green, till, emerging from the thin wood, we debouched upon the alluvial plain, bounded by emerald trees, with the welcome river flashing bright in the western sun. At 6 p.m., after walking 10 miles, we stood upon the bank opposite Kohode, the village of a friendly Wazegura chief. Sultan Momba donned his scarlet coat forthwith, ordered the village boat to be launched, and as we landed, wrung our hands with many greetings and roars of laughter.

The Pangani River, called at Kohode "Rufu" or "Lufu," is about 80 yards broad: it flows deep and strong, under high banks of stiff clay, is reddened, especially after rain, by the rich loam of the hills, and abounds in hippopotamus and crocodiles. My companion, an old Himalayan, thought that he could detect in it the peculiar taste of snow-water, and the Baloch who, like all orientals, believe that drinking the element during night impairs



digestion, make of this an exception. The alluvial soil on the banks is clothed with coarse grass of a lively green, and in some places with a screen of trees. The stream is navigable, but boats are arrested by the falls below, and portages are not yet known in East Africa.

The next day was a halt at Kohode. It is the normal cultivator's village. Surrounded and concealed by a stout palisade of tree-trunks,—where foes and beasts abound the defences are doubled and trebled,—with low narrow arches formed by inclining the beams, is a heap of little, thatched, wattle-and-dab huts, here square, there circular, generally huddled together, but if space allow, scattered over some hundred yards. Goats, sheep, and cows, which thrive here, are stalled near the human habitations. The scene reminded my companion of villages in the Tirhai and the Dehra Dhoon: there was the same peaceful, quiet look, sheltered situation, and circle of tall trees. The people are cultivators, tame harmless heathen to all but one another; unfortunately they have become masters of muskets, and use the arm to oppress and plunder those who have it not. Sultan Momba, a stout, jolly, beardless young black, with an explosive laugh, and the voice of one calling out in the wilderness, has made himself a thorn in the side of Sultan Kimwere. He harries Usumbara cattle with a merciless hand. In supplying us with a bullock and milk, he said with a roar of mirth and jerking his thumb towards the blue hills, where the smoke of watch-fires curled high, that we had already become the king's guests. Our Baloch guard applauded this congenial soul, patted him on the shoulder, and swore that with a score of their number he might become lord of the mountains. From Kohode, which is more than half way, there are two roads to Fuga. The direct line crosses the highlands and numbers two marches; short, but at this season waterless. That along the river is of course longer; we determined, however, to see the stream, and we doubted the power of our men to front the passes in such heat. The worst of these walking journeys is that the least accident disables the traveller, and accidents will happen to the best regulated parties.

On the 13th of February, having exchanged warm adieux, we were ferried over the river, and at 7 A.M. fell into the beaten path upon the alluvial plain. After a few minutes' march we crossed a bridge consisting of a fallen tree, which spans the Luangera, the Luere of Herr Petermann. This deep silent stream, 23 or 24 feet broad, drains the north-eastern Bumburri mountains and is an important affluent of the Pangani. Thence marching ever the plain we skirted two small red cones, "Nguo," which are the apices of the broken ground below Vugiri. Like Sagama, this is a wall of rock, well-wooded upon the summits, with pre-

cipitous sides, which serve as boundaries to the alluvial flat. The Usumbara plateau above is said to be rather rolling ground than flat surface, and is fertile enough to support an abundant population of Washenzi. Above the junction of the Luangera, the Pangani River divides into mountain torrents, roaring over rocky and tortuous beds, forming little green islands, which are favourite sites for villages. The country appeared a garden after the deserts which we had traversed. Cocos and tall trees concealed the stream, and flocks and herds clustered over the plain. The settlements are entered by rude bridges, in the shape of narrow planks laid horizontally upon piers,—forked uprights planted a few feet apart,—sometimes parapetted with basket work, and supplied with cords of knotty fibrous creepers to steady the traveller's step. These the number and daring of the crocodiles render absolutely necessary.

We halted from 10 A.M. till 4, under a spreading tamarind near Zufura, a village on an island of the Pangani, distant about 2 miles from Mount Vugiri. Black clouds capped the hill-tops, cooling the fierce Simoom and promising a shower; we were approaching the land of constant rain. Resuming our march we crossed a dry fiumara trending towards the river; traversed a hill-spur of rolling and thorny red ground, to avoid a deep bend of the stream; passed a place where rushes and tiger-grass choked the bed, and where the divided waters, issuing from a black jungle, foamed down a steep incline of rocks; and finally at 5 P.M. entered Msiki Nguru, a Wazegura village distant from Kohode 12 miles. It is a cluster of huts in an island, formed by divers branchings of the Pangani. The headman was sick, but we met with a hospitable reception. As yet, uninitiated in the secret of strewing ashes round the legs of our cartels, we passed a night with the ants and other little beings which shall be nameless. Our hosts expressed great alarm about the Masai, which the sequel justified, as we had scarcely left the country before a plundering party attacked two neighbouring villages, murdered the inhabitants and drove off the herds.

At sunrise next morning we resumed our march, travelling up the river which is here called Kirua. It is a line of sedge and grass as far as the Maurwi village, 3 miles from Msiki Nguru; here the several branches anastomose, forming a strong but navigable stream, about 30 yards broad, and edged with a deep fringe of verdure. Thence, we turned northwards in the direction of Tamota, another bluff headland in the hill-curtain of Usumbara; the soil was a red clay, here cultivated, there a thorny jungle. The paths were full of people, chiefly women, laden with manioc, holcus and Indian corn, plantains, fowls, and other articles of food; they were walking to a golio or market, held in an open

plain. Having duly stared and been stared at, we unloaded for rest under a spreading tree hard by. Again clouds obscured the sun, a shower was imminent, and thunder rumbled in the hills; it became evident that the wet season was fast approaching.

We resumed at 1:30 P.M., passing on the right Pasunga, a large double-fenced village, belonging to one of Kimwere's multitudinous sons, and on the left a sheet of muddy water, where my companion shot a fine specimen of the gorgous crested crane. At 2:30 we skirted another village, where the people peremptorily summoned us to halt. This annoyance, which frequently occurred, was owing to the good Wazira. He observed that we returned more than an equivalent for every goat presented, and resolved that we should never sight a village without being mulcted in sprigged muslin. When things came to this state, we saw the necessity of changing tactics; we laughed in the faces of our angry expostulators, and bidding them stop us if they could, pursued our road. Presently, ascending a hill and turning abruptly N.E., we found ourselves opposite, and about 10 miles from, a lofty azure wall, the mountains of Fuga.

Below, the plain is full of villages, like haycocks, in clumps; the fruitful earth scratched with the smallest of hoes yields abundant return:—tall tamarinds, large-leaved plantains, papaws and other trees are scattered over the surface; water stands in black pools, and around it luxuriant sugar-cane waves almost wild. We found the cane to be of the edible kind; that used for making sugar is too luscious to be agreeable. At 4 P.M., after walking 16 miles, *in toto*, a violent storm of thunder, lightning, rain and raw wind from the S.W., drove us into the Bandani or Palaver-house of a large village. Here we passed the night, with fires to keep off fever and mosquitoes. Our Baloch looked at the clouds, shook their heads, and declared that the "Kusi" or wet monsoon had fairly commenced.

The 15th February opened with one of those steady little cataclysms which, to be seen to advantage, must be seen near the Line. At 11 A.M., thoroughly tired of the steaming Bandani, we loaded our men and set out towards the Fuga Hills. As we approached them, the rain, shrank to a spitting, gradually ceased, and gave place to that reeking, fetid, sepulchral heat, which African travellers dread. The path lay through the usual red clay and jungle, crossed a low ground where trees decayed in stagnant water, and spanned a well cultivated black plain, lying at the base of the mountains. We rested a few minutes before commencing the ascent: the path, slippery with black mire, had wearied our slaves, though aided with three fresh porters, and the damp heat overpowered the whole party.

At 1 P.M. we entered upon the ascent. It began gently

winding amongst groves of large coarse bananas,\* with huge branches of young green fruit and rotting leaves. The "musa" here is the staff of life, and, besides bread, it supplies a house with fuel, cups, spoons, plates, and even bottles. The banana is probably an aboriginal of East Africa; it grows, I am told, almost spontaneously upon the Uyamwezi lake. Never transplanted, the fruit in time degenerates: it is easy to see, however, that the stock is noble. Emerging from the dripping canopy, we followed a steep goat-path, crossed a little burn of pellucid water, and, having reached the midway height, sat down to rest and take a few compass-sights.

The view before us was extensive, if not beautiful. Opposite, half-veiled with rank steam—the "smokes" of Western Africa—was the yellow Nyika or Wazegura wilderness, traversed by the Mkomafi, an affluent of the Pangani river. Three dwarf cones, the "Mbara Hills," bearing 230, and distant about 8 miles, accurately defined this portion of the country. Almost on the horizon we could distinguish the well-wooded line of the Pangani, and around it lay an interminable plain. Nearer, the mountains upon which we sat fell in rugged folds, clothed with patches of plantains, the wild mulberry, the custard-apple, and tall trees whose brilliant green contrasted strangely with the red ochre earth from which they sprang. The salsaparilla vine being festooned from the high boughs of the tamarind, the toddy-palm raised its fantastic arms over the dwarf fan-palm, and the air was scented with bitter orange and herbs not unlike mint and sage. A palpable change of climate had already taken place, and the sunshine was tempered with clouds, which we now blessed.

Resuming our march after a few minutes' halt, we climbed rather than walked up the deep zigzag of a torrent, and at 4 p.m. found ourselves on the summit of the ridge. Here the guide pointed towards the "water of Masindi," a small lake, upon whose banks elephants are said to exist; the air, however, was too misty for the compass. Distant about 10 miles, and over-spread with clouds, the huge barrier of Makumbara closed the northern view. Our people presently interrupted the colloquy, begging us to taste the water, which was icy cold; it had a perceptible ferruginous flavour, sparkled in the cup, and had covered its spring-head with a coat of oxide. East Africa, I may observe, is a "land whose stones are iron," and some of the metal worked in the interior is of admirable quality.

We now stood upon the summit of the mountains, hut, as far

\* The banana is the *Musa sapientum*, the plantain is the *M. paradisiaca*. I do not know any other distinction. In India the small variety is called a plantain; the larger, "horse-plantain." The French, on the other hand, term the more delicate fruit "banaue."

as the eye could see, there was no table-land. After a three mile walk, winding along the flanks of rounded hills, and crossing a small torrent which seemed to freeze our parched feet, we turned a corner and suddenly sighted a heap of huts crowning a grassy cone—Fuga. This being one of the three cities where ingress is forbidden to strangers, we were led by Muinyi Wazira to the “travellers’ bungalow,” in the form of tattered hovels, about 300 feet below the settlement. The cold rain and sharp rarefied air made any shelter acceptable. We cleared the interior of sheep and goats, housed our properties, and sent a message to the Sultan, requesting the honour of an audience.

Before dark appeared three mdoe or “ministers,” who, in a long palaver, declared that council must squat upon two knotty points: why we had entered Usumbara *via* the hostile Wazeguras? and when his Majesty would be permitted by the mganga or magician-priest to see us? These objections being overruled with a strong hand, we were at once led to the royal abode, which is a mere clump of the usual huts, surrounded by trees, and crowning a little eminence opposite to and below Fuga.

Sultan Kimwere is an old man, with emaciated frame, shaven head, beardless wrinkled face, somewhat like an elderly lady, red eyes, toothless jaws, and hands and feet stained with leprous spots. His subjects declare him to be a centagenarian; he is certainly dying of age and decay. The royal dress was a Surat cap, much the worse for wear, and a loin-wrap equally so; he was covered, as he lay upon his cot, with the doubled cotton cloth called in India a “doputta,” and he rested upon a Persian rug apparently coeval with himself. His hut was that of a simple cultivator, but it was redolent of dignitaries, dirty as their prince, and each holding a long-stemmed pipe with small ebony bowl. We were seated upon low stools in front of the couch, asked our errand, and welcomed to Fuga. As none could read our letters of introduction, I was obliged to act as secretary. The Sultan had heard that we were addicted to scrutinising stars, stones, and roots. He therefore decided that we were European mganga or medicine-men, and directed us at once to compound a draught which would restore to him that evening health and strength. I replied that our drugs were all left behind at Pangani. By no means satisfied with the excuse, he signified that we had better wander about the hills and seek the plants required. On our return home, after half an hour’s conversation, we found, by way of present, a fat bullock, a basketful of fine white sima, Indian corn pounded and boiled to a paste with water, and balls of unripe plantains mashed with sour milk. We had marched that day 10 fatiguing miles; the sougling blast, the groaning trees,

and the pattering rain heard from inside a warm hut affected us pleasantly, and we slept like travellers.

Kimwere, Sultan of Usumbara, is the fourth of a dynasty supposed to have originated from Nguru, a hilly region south of the Pangani. His father Shabugah extended the frontier from Pare to the coast, and from Msihi to the river; he left Usumbara to Kimwere, Bumburri and Meringa to younger sons, and Msihi, a mountain two days N.E. of Fuga, to a favourite daughter. Kimwere, in youth a warrior of fame, ranked highest of the mountain kings; the other members of the triumvirate were Bana Rongwa of Chaga and Bana Kizunga of the Wakuafi. In age he has lost ground. His sister's sons, the chiefs of Bungu in Msihi, rebelled, and were reduced only by aid of 20 Baloch, and the Wazegura are now troublesome borderers. He is said to have 300 wives, who have borne him between 80 and 90 sons. Of these the eldest, Muinyi Khatib, chief of the Kirori village, will succeed him. The king is a most pragmatical pagan: many of his children, however, have Islamized.

Kimwere rules, like African kings generally, by the sale of his subjects. Death, imprisonment, and mutilation of the hand, are foreign punishments, and rare, whilst confiscation and sale are common and indigenous. He is like the Amir of Harar, a thorough despot: he sells without reason man and woman, gentle and simple, individually, by families or by villages. The Sultan's person is sacred; even a runaway slave is pardoned if successful in touching majesty: there are also certain "lodges" inhabited by the chief magician-priests, where criminals take sanctuary. Kimwere has a body-guard of 400 musketeers, whom he calls his Waengrezi, or Englishmen: they are dispersed in the surrounding villages, for the war-horn is now silent and the watch-fire never leaves the mountain.

Money is not current at Usumbara. The small change is beads, the higher specie American domestics. No one holds property without the king's permission, and, as we had an opportunity of seeing, the greatest man dare not receive a present openly. His revenue is thus collected: cattle-breeders must offer to him the first fruit of flock or herd, elephant-hunters one of every two tusks, and traders cloth and beads. Cultivators are rated 10 measures of grain annually, which accounts for the quantity exported from Tanga and Pangani to Zanzibar, and even Arabia. Kimwere reserves part of his revenues for himself and his fine family; the rest is divided amongst his soldiers and councillors.

The principal capital of Usumbara is Fuga, distant 37 miles in a straight line N.W. of Pangani; along the river 74 or 75. It is nearly 4500 feet above the sea-line, and enjoys the cool, healthy

climate. The town contains about 500 huts, and, I was informed, 3000 inhabitants; it is unwallled and composed of the circular habitations common to Africa, from Harar to Timbuku, frameworks of concentric wattle rings, wrapped round with plantain leaf, and plastered with fine mud inside: a low solid door acts also as window, and a haystack roof is supported by a single tree. The population is abundantly leavened with Arab blood; it thrives, to judge by the number of children, who are apparently more than the normal fifth, and the snowy heads of the elders prove that we are still in the land of Macrobian Ethiopians. The men, who, though of light brown colour, are short and plain, file their teeth to a point, and brand a circular beauty-spot in the centre of the forehead. Their dress is a cotton sheet over the shoulders, and a cloth or hide round their loins; the characteristic kilt of the plain Bedouins, a deep line of dried and split rush or grass tied round the middle, cannot be used on the hill-tops. A knife is stuck in the girdle, and they always carry a pipe, a bow, and a few iron or bone-tipped arrows. The women are adorned with talismans in leather bags, and massive collars of beads falling from the neck; a "distinguished person" will carry from three to four pounds of these "barbaric decorations;" the rest of the dress is a sheet bound tightly round the bosom and falling to the ankles. This people is comparatively industrious. The husband and children work in the fields; those who have cattle drive them to graze when the sun has dried up the dew, and towards evening fence them in the yard and stow away the younglings within the hut. To the wife's share fall the labours of cleaning the cattle-pen, fetching wood and water, pounding Indian corn in a huge wooden mortar, baking plantain bread when she can get it, and carrying the baby. Both sexes are dirty, diseased, and half-starved; a timid, dismal, and ignoble race are these "children of the mist," as savages who have changed pastoral for agricultural life mostly appear to be.

The highlands of Fuga must be thickly inhabited; almost every hill is crowned with little "lodges," distinguished from afar by pale blue smoke. The scene strongly reminded me of the Blue Mountains in South India. There were the same rounded grassy cones, spanned by narrow footpaths—mere lines of red soil—the same "sholas," or patches of forest, clothing the slopes, the same emerald swamps through which crystal runnels continually trickle, and little torrents and rocky luns. The northern and eastern faces are bluff and barren, the southern and western abound in luxuriant vegetation, wild and cultivated, Indian corn and holcus, plantains, huge sugar canes, and tobacco. The latter article, made into thin round cakes, and neatly packed in banana-leaves, is exported to Zanzibar and the maritime regions; its flavour is considered superior to the other growths of the mainland. The formation of

the mountains is granite and sandstone, covered with a red clay.

The rainy season had fairly set in at Fuga; heavy clouds rolled up from the s.w., and the weather was a succession of drip, drizzle, and drench. In vain we looked for a star; even the sun had not power to disperse the thick raw vapours—we were compelled to leave Fuga without a single observation. I did not dare to linger long upon the hill-tops. The rain would make the low country a hot-bed of sickness: our men were not clothed to resist the cold of the mountains ( $73^{\circ}$  Fahr. at 4 P.M., whilst upon the plains it ranged from  $81^{\circ}$  to  $99^{\circ}$ ), and we expected daily the attack of "seasoning-fever." In the dry monsoon, this road might be made practicable to Chaga and Kilimanjaro, with an escort of 100 musketeers, and at an expense of 600*l.*; the invalid who desires to avail himself of this "sanatorium," as it is now called by the Indian papers, may, if sound in wind, limb, and digestion, reach the snowy region—if such exist—after a ten days' mountain march.

On Monday, the 16th February, we took leave of Kimwere; he was much mortified that our rambles had not produced a plant of sovereign value against decrepitude, and the next morning we descended the hills in a Scotch mist which concealed every object from view, and deepened into a drenching shower upon the fertile plains. That night we slept at Pasunga, the next at Msiki Mguru, and the third, after marching 17 miles, our greatest distance, at Kohode—places already described. We had no adventures, but daily storms of thunder, lightning and rain, which made the returning as disagreeable as the going had been pleasant.

At Kohode it was resolved to follow the river course, and to ascertain by inspection if the account of its falls and rapids had been exaggerated. At 9 A.M. on the 19th February we set out over the alluvial plain, along the left bank of the Pangani, and presently entered familiar land, a thorny wilderness of rough, stony, red ground, with the stream flowing in its channel hard on our right. At 1 P.M. we halted to bathe and drink, as it would be some hours before we should sight the river again. During the tornado of thunder and lightning which followed us, I observed that our savages shot their iron-tipped arrows in the air, as the Thracians of Herodotus were wont to do, and the Bheels and Cooleys of India still do. Can this be the primitive paratonnerre, preserved traditionally from ages long forgotten by man when Franklin taught him to "disarm the storm?" The splashing rain and gusty cold wind made the slaves whimper: we pursued our road, and about 4 P.M., after threading by a goat-path the dripping jungle, we found ourselves at Kiranga. This large Wazegura village lies on the right bank of the Pangani. The



inhabitants turned out with bows and muskets to feast their eyes ; all, however, were civil, and readily gave coco-nuts in exchange for tobacco.

The Pangani here is a strong rapid stream flowing between high curtains of trees and underwood, and entering a rocky trough ; hills on both sides in some places approach within a few yards of the banks. Leaving Kiranga, we followed its course along a vile footpath, slippery with dark mire, encroached upon by thorn-trees, and almost concealed by tiger-grass. The air was damp and oppressive, and the decayed vegetation exhaled the usual bouquet. As we advanced the roar of the swollen stream indicated rapids, whilst an occasional glimpse through its green wall showed the reef surface streaked with lines of snowy foam. Heavy nimbi purpled the western skies, and we began to inquire of Muinyi Wazira whether a village was at hand.

About sunset, after marching 15 miles, we suddenly saw coeos, the " Traveller's Joy " in these lands, nodding their feathery heads ; presently crossing an arm of the river by a long rickety bridge, we entered Kizungu, a Wazegura village, and were received with some ceremony by the headmen. They emptied a hut of its inmates, introduced us, and sat down for the usual palaver. Knowing that the village had a bad name and deserved it, my companion and I fired our revolvers into trees ; the sensation was such that we seized the opportunity of offering cloth in exchange for rice and ghee. No provisions, however, were procurable ; our escort went to bed supperless, and we should have followed their example, had not one of the elders secretly brought after dark an old hen. The hen was easily despatched by three hungry men. We then placed our arms in a handy position, and were lulled to sleep by the moaning wind and the continuous pattering of the rain.

Early next morning we were aroused by Wazira, the guide, and after the usual delays found ourselves upon the road about 7 A.M. The country traversed was the reflection of what we had passed through, black soil in the lower, and red in the higher levels, rolling ground, torrent beds, thorny jungle, and thick, succulent tiger-grass. Hills still girt the river on both sides. At 9 A.M. we sighted from some distance the falls of the Pangani, which are not unlike the " Torc cascade " in books. Here the whole stream, emerging from the dense growth of tropical forest, hurls itself in three several sheets, fringed with flashing foam, down a rugged wall of dark rock ; half way the drop is broken by a narrow shelf or ledge ; a second leap precipitates the waters into the seething basin below. These falls must be grand after rain, when the swollen river forms a single horse-shoe, and acquires volume sufficient to clear the ledge which breaks its shrunken stream.

As we journeyed on, the heat became intense; the clouds hugged the cool mountain-tops, and the sun shone stingingly through the clear air. At 10 A.M., our people being clear worn out, we halted upon the bank of a dry fiumara, in whose rushy and jungly bed a little water was found. Half-an-hour's rest, a coco-nut each,—and some were so hungry that they chewed the pulp of dry calabashes,—and a pipe somewhat restored us. We resumed our march over a mountainous rolling waste of green grass, enlivened by occasional glimpses of the river, with its broad breast swelling between two rows of tall luxuriant trees. Villages became frequent. At 3 P.M., after marching 14 miles we entered Chogwe, and were received by the Jemadar and his garrison with all the honours. It would serve no geographical purpose to describe the various occupations of the next week.

On Thursday, the 26th of February, 1857, we returned to Pangani and began making preparations for a coasting voyage southwards. We had dismissed the *Riami*, and were in hourly expectation of a “Battela” from Zanzibar. But on Sunday, the 1st March, Captain Speke, my Portuguese servant, and I, were prostrated by the terrible bilious remittent of the coast. It was vain to struggle—the disease had us down, and appeared inclined for mischief. In accordance with Colonel Hamerton's injunctions, I determined upon returning to Zanzibar, and five days afterwards the Battela appearing,—our thoughtful friend had stored her with provisions necessary for our little cruise,—we reluctantly gave up the idea of sailing southwards and went on board. Early in the afternoon of the next day we reached our destination, were received by the consul with his wonted hospitality, and were duly quinned by Mr. Frost, the intelligent medical officer attached to the consulate. We had thus in our persons verified the old rule, that no European can travel or labour in the interior more than three weeks without the acclimatizing fever.

The field-book and sketch-map, now submitted to the Society, are ordinary route surveys, as carefully made as our various and great difficulties would permit. For distances we depended upon a pedometer and careful timing. We could not set up marks, and at times the thickness of the jungle rendered sights somewhat uncertain. Though observations were taken when feasible, at Fuga the monsoon was against us, and at no time of day or night was an ell of sky in view. On the coast we might easily have rectified the extraordinary errors of the charts; but not having been supplied with copies, we concluded that a regular survey had left us nothing to do. Finally, we did not waste time upon the details of a river which, being unnavigable, can be of little benefit to commerce.

In conclusion, I must draw the attention of the Society to an

important point, *i.e.* the difference between our distances and those given by the Rev. J. Erhardt to be inserted in his map. We place Fuga 37 miles in direct line from the sea; while, according to him, it is 82. According to him, the road—adding a quarter-distance for windings—would be about 100 miles: we found it between 74 and 75. I most readily bear testimony, as far as I can judge, to his general correctness, and to the great value of that which may be called the ethnographic portion. But I question *all the distances*. Mr. Cooley reduces the road between Mombasa and Kilimanjaro from 200 to 130 miles: to judge by analogy a farther subtraction might be applied. Our longest march was 17 miles: after four days' continued work the slaves were dead-beat; some of our escort murmured loudly at our habits, and the Pangani people considered the rate of walking excessive. Without measuring instruments, or the custom of correct timing, it is difficult to estimate distance. Twenty miles in a tropical sun, over bad ground, where the step is shortened, and without water, appear 40 in Europe, whilst the hour's halt seems but a few minutes.

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### PART III.

#### *Progress of the Expedition into the Interior.\**

THE journals of Captain Burton not having been received, the following notes and extracts from the correspondence will elucidate the route, laid down by Captain Speke, F.R.G.S.

The travellers, after their ascent of the Pangani river detailed in the preceding pages, returned to Zanzibar about March 6th, 1857, Captain Burton and some of the party being prostrated by bilious remittent fever. They left Zanzibar after the rainy season, much indebted to the late Colonel Hamerton, and reached the mouth of the Kingani river at Bagamoyo. They started for the interior from Kaole, about 10 miles s. of Bagamoyo, on June 26th, 1857.

The party consisted of Captains Burton and Speke and 80 men. They had 5 donkeys for riding and 20 donkeys to carry their numerous packages; some portion of their goods was left behind at starting because porters were not procurable. They made a forced march. Had they not left at once, the Arabs and Sawahili, worked upon by the Hindu Banyans and the Christian merchants of Zanzibar, would hardly have allowed them to enter, according to Colonel Hamerton's opinion.

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\* See "Proceedings," R. G. S., vol. ii. pages 52 and 323.

The first despatches were sent from Duthumi, near the head of one of the tributaries of the Kingani and about 120 English miles from the coast, dated July 20th. The second letters were sent from Zungomero, 192½ miles (English) by pedometer from the coast, dated August 2nd, 1857. The whole camp had then been laid up with fever: Captain Burton had been prostrated for 20 days. They reached this station, Zungomero, on July 25th, and left it on August 7th, sending his papers and a box of specimens to the coast by means of a slave—a dangerous trust, but which was successful. Their stay at Zungomero in some measure restored them, but they were still weak. Their first march led them, after passing through a long alluvial tract, on to dry and rocky, yet inhabited hills,—in Captain Burton's opinion the first step to the high lands of Ugogo. With considerable trouble, on account of their animals, they ascended the Goma Pass, about 2200 feet by boiling-point thermometer above the sea-level. The party had behaved tolerably well. This information was sent from Inenge on September 6th. They were then at the eastern foot of the Rubeho chain, which attains an elevation of 5646 feet.

Captain Speke regrets being incapable of obtaining an observation for latitude during the passage of this chain, but he had such a sharp stroke of fever from ascending the mountain that all strength failed him till reaching Ugogi. The last despatch received from Captain Speke was dated Unyanyembe, November 20th, 1857 (in about lat. 5° s.), having travelled (according to their route-maps, estimated by pedometer) about 540 English miles from the coast. Captain Burton's itinerary was to be forwarded from Ujiji on the Lake.

Captain Speke, writing to Dr. Shaw from Camp Zungomero, says—

“I have the pleasure to enclose a sketch of the route made by the expedition under command of Captain Burton, with a short descriptive Appendix, which I shall feel obliged by your laying before the President and Fellows of the Society. It is with great regret I have to inform you that the chronometers have all failed in their ratings, notwithstanding the time and trouble I devoted to them at Zanzibar. I have, in consequence, been obliged to depend on the few latitudes by stars the ever-cloudy sky afforded me, on a pedometer for distances, and the general direction by compass to guide me in the construction of the map. I carried the latter instrument in my hand the whole way, constantly observing the oscillations of the card and taking the means. The pedometer gave me a very steady exaggerative rate, but, unfortunately, the last two marches I was obliged to append it to a servant whose gait much differs from my own; this was in consequence of a severe fever I caught at Duthumi, that obliged

me, through weakness, to ride on here. Taking lunars is quite impossible so near the hills; two objects scarcely ever being in view at the same time in consequence of the constantly cloudy state of the weather, added to which my assisting servants are both ill. Captain Burton has unfortunately been laid up for some time with an intermittent fever, and in consequence has not been able to do any other work than keep a diary. He is getting better now, and hopes on arrival at Ugogo—an elevated, healthy, and clear place by report—to send in all observations, &c. With the Appendix is a list of the meridian altitudes of the various objects I took and have employed in constructing the map. To show the sickly nature of the climate at this season, nearly all the camp have come to us by turns for medicine. I must add that I commenced the journey by taking rounds of observations, with the heights of all the useful celestial objects, but the unfavourable nature of the atmosphere soon caused me to desist, and now I think myself lucky to catch a latitude occasionally. About the value of the Government boiling thermometer for determining heights I am in great doubt; it is the only one I have that reads to tenths, but another, on which I feel great reliance, affords a good check to it, and will always be a means of detecting the quality of the water used."

From the sea-shore there is a slight rise to the village Kaole, the point of departure; thence to Bomani the country maintains the same low level; is generally dotted about by small villages, around which all vegetable matter, such as is usually seen in India, grows in the most extravagant luxuriance. Trees are plentifully dispersed about, and grass grows thick and tall everywhere. The soil is sand, darkened by a rich vegetable mould. At Bomani there is another slight rise of the country; this elevation continues as a boundary to the Kingani valley, as far as the Mboamaji junction, and from the top of it the Kingani valley, including all the visible country to the northwards, appears a low continuous flat. To reach this junction the road sometimes leads along this rolling elevated ground, at others dips into the valley, passing continually through trees, with thick, high undergrowing grass—there is very little bush jungle anywhere—and occasionally through some fine cultivation. The general lowness, and owing to the abundance of trees and grass, closeness of the country, precludes any chance of making an exact compass-survey. On reaching the junction the track opens on a slightly different aspect; the higher ground formerly on our left ceases to overhang us, the trees are a little wider apart, and the grass, though equally thick, is much shorter, giving the country a park-like appearance. Still there is no view. Crops vegetate around the few villages in gigantic growth, and so matters continue

alternating till Kidunda ("Little Hill") is reached. From Kidunda to Mgeta is a rolling, stony jungle; the grass is still shorter than on the preceding line, and the trees are chiefly mimosa. The Mgeta, a small affluent to the Kingani River, is passed by means of trees thrown across it,—a difficult and dangerous arrangement for the transport of property. The way from Mgeta to Kiruru is also of a park-like nature: along this line many herds of gnu and other antelopes were seen. Leaving Kiruru, we come under the hills forming the coast range; here the jungle and grass are of the most gigantic order, excepting in those places where the husbandman has usurped their place by the fruits of his labour.

The mountains rise directly out of the plains without having any foundationary elevation; our march has therefore been along one almost undeviating flat. The Kingani may be said to have a flow quite equal to, if not exceeding, that of the Pangani, but the water, possibly owing to the season, is of a different colour and taste: the latter, the Pangani, as we found it in the interior, was of a bluish-grey colour, not unlike a new slate pencil, and had a harsh, raw taste; but this river, the Kingani, is muddy, red, and the water soft and sweet. There is a bar across its mouth, obstructing the entrance of native craft, excepting at high tide. Many of the rafters that find their way into the Zanzibar market come down this river from as far as three days' journey. I visited the hot springs Maji Yaweta, but could not approach the centre of heat in consequence of the swampy nature of the ground around it. The water I tasted was warm and very sweet; the area of the place about which the water was boiling and jetting appeared to be 2000 square feet. On the surface were sundry small white mounds of lime, and the face generally bore a whitish aspect, tinged with some streaks of yellow. The specimens I brought away will be transmitted by Captain Burton, along with his other collections, to the Bombay Geographical Society.

Bomani .. ..	* Benetnasch ..	° 6 30 29	South lat.
	* $\alpha$ Centauri ..	..	
Nzasa .. ..	* $\alpha$ Centauri ..	6 35 47	"
Thumba La Here ..	* $\beta$ Centauri ..	..	
	* $\alpha$ Centauri ..	6 49 23	"
	* $\gamma$ Cygni ..	..	
Muhonyera .. ..	* $\beta$ Centauri ..	6 55 20	"
	* $\alpha$ Centauri ..	..	
Madege Mado go ..	$\Omega$ .. ..	7 16 0	"
	* $\alpha$ Centauri ..	..	
Kidunda .. ..	* $\alpha$ Centauri ..	7 16 23	"
Zungomero .. ..	* $\alpha$ $\Delta$ Aust. ..	..	
	* Vega .. ..	7 27 0	"
	* Vega .. ..	..	•

Total distance shown by pedometer, 192½ miles (statute?). Height of Zungomero Station by Government boiling thermometer, 278 feet.

J. H. SPEKE.

Zungomero, 1st August, 1857.

From Unyanyembe, Captain Speke, on the 20th of November, 1857, transmits a farther portion of his route-map with the following remarks:—

“Since leaving Ugogo my principle in protracting the map has been in carefully observing the distance by time, making due allowance for curvature, &c., of the track, and by taking the latitude from a star at every 10 to 20 miles. The same name for different villages, it will be noticed, is repeated two or three times in certain places about the map. This reiteration signifies that those villages are all in the same district, the name of which they take. The proper signification of the word Unyamwezi has not yet been determined. The name of the country, and not its occupants, as I have hitherto used in marking out the limits of the principal tribes (which is usually denoted by the syllable Wa preceding the name), is therefore given for the present. Another source of great regret is in the destruction, by a fall whilst boiling, of our last thermometer. I am now reduced to a bath thermometer by Newman, cut to degrees only, but readable by estimation very much closer; I began using it first at Rubuga, and find it answers pretty uniformly. Col. Sykes’s method, as given in the ‘Hints to Travellers’ of the Royal Geographical Society, is the one I have adopted in reducing all my calculations for levelling since the commencement.

### *Equipment of the Expedition.*

SIR, Camp, Zungomero in Khutu, about 200 miles  
from coast, Sunday, 2nd Aug., 1857.

I promised you an account of our outfit: here it is, pretty perfect. It should have been sent before, but all our camp has been laid up with fever. We are getting on better for a few days’ rest. I had fever twenty days, and could not halt; some marches were 20 miles.

*The Party.*—R. F. Burton, commanding; second in command, J. H. Speke. (A doctor sadly wanted.) Ras Kafilah Shaykh Said ben Salim el Lamki, with 4 slaves armed with muskets, 1 slave boy and 2 slave girls. His assistant, Muinyi Wazir, a Sawahili man who acts as linguist and guide. 13 Baloch guards as escort, including jemadar as commandant; with 2 slaves: 1 of the Baloch is a tailor, and most useful. 2 Portuguese servants. 2 black servants armed with swords, gun-carriers, &c. 9 black guards for asses, armed with muskets, and to act as guides, slaves belonging to Ramji, an Indian merchant (one to follow with our remaining equipment). 5 donkey-men. 36 porters (Unyamwezi men) carrying American domestics, blue cotton cloth, beads of sorts, especially pink and black, and brass wire, Nos. 7 and 8; value about 600 dollars (We are to be followed by 22 more.) 9 extra porters engaged *en route* to assist the asses. Total 80 men.

*Provisions, &c.*—This is the harvest season, so travellers rarely carry provisions.

At other times they drive goats and sheep for provisions. 1 dozen brandy (to be followed by 4 dozen more); 1 box cigars (tobacco here everywhere procurable—5 large cakes for 1 cloth of 4 cubits); 5 boxes tea (each 6 lbs.); a little coffee; 2 bottles curry stuff, besides ginger, rock and common salt, red and black pepper, one bottle each, pickles, soap, and spices; 20 lbs. pressed vegetables; 1 bottle vinegar; 2 bottles oil; 20 lbs. sugar (honey procurable in country); rice, Indian corn, holcus, fowls, ducks, sheep, goats, and eggs, are generally purchasable.

*Land Conveyance.*—5 donkeys for riding, with Arab saddles and halters (English would have been better); 20 donkeys for carrying goods; 20 packsaddles, with straps and ropes (these are partly procurable in the country, and partly made by Belochies of fan-palm); 20 sacks for asses (a few extra), packing-needles, and twine.

*Arms and Ammunition*, including 2 smooth bores, 3 rifles, a 3-revolver, spare fittings, &c., and swords. Each gun has its leather bag with three compartments, for powder-flask, ball, caps, patches, &c. Also 100 lbs. gunpowder (2 safety copper magazines and others); 60 lbs. shot; 380 lbs. lead bullets, cast of hardened material at Arseual, Bombay, placed in boxes 40 lbs. each for convenience of carrying, also to serve as specimen boxes, and screwed down to prevent pilfering; 20,000 copper caps; wadding.

The Belochies are armed with matchlocks, shields, swords, daggers, and knives; plenty of falitah, or matchlock match. They have for ammunition—40 lbs. gunpowder (4 kegs); 1000 lead bullets; 1000 flints for slaves' and blacks' muskets. To be followed by about an equal quantity of ammunition. Total 500 rounds for each big gun, and 2000 for each little gun.

*Camp Furniture.*—1 sepoy's rowtie; 1 small (gable-shaped) tent of two sails joined, to cover and shelter property in this land of perpetual rains; 1 table and chair; 1 Crimean canteen tin, with knives and forks, kettle, cooking-pots, &c.; 1 bed, painted tarpaulin cover, 2 large cotton pillows for stuffing birds, 1 air pillow, 2 waterproof blankets (most useful), 1 Maltese blanket (remarkably good), and 2 other blankets; 1 bed. cork, 2 pillows, 3 blankets, and mosquito net. The Portuguese boys have thick cotton padded mattresses, pillows, and blankets. All the servants have some kind of bedding; kitaudabs or native bedsteads are sometimes met with in the villages, but they are about 4 ft. by 2; 3 solid leather portmanteaus for clothes and books; 1 box, like Indian petarah, for books; 1 patent leather bag for books, washing materials, diaries, drawing-books, &c.; 1 small leather bag, round neck, for instruments, &c.; 5 canvas bags for kit generally; 3 mats to sit on.

*Instruments.*—1 lever watch; 2 chronometers; 2 prismatic compasses, slings, and stands; 1 ship's azimuth compass; 2 pocket compasses; 1 pocket thermometer; 1 portable sundial; 1 rain gauge; 1 evaporating dish; 2 sextants and boxes, and canvas bags to be slung over porters' shoulders; \* 2 artificial horizons (a little extra mercury, to be followed by more); 1 pocket lens; 1 mountain barometer lent by Bombay Geographical Society (very delicate); 3 thermometers; 1 measuring tape (100 ft.); 1 sounding lead; 2 boiling thermometers; 1 box of instruments; 1 glass; 1 telescope; 2 ft. rule, brass slide; 1 pocket pedometer by Dixie (an invaluable instrument, 3 more wanted); 1 parallel ruler.

*Stationery.*—Foolscap paper; 1 ream common paper; 6 blank books; 3 Letts' diaries; 2 dozen pencils; 6 pieces caoutchouc; 6 metallic note books; 3 memorandum ditto; 1 box wafers and sealing wax; 2 field books; steel pens; bone ditto; ink powder which makes up well without acid; 3 bottles ink; 1 bottle native ink; 2 sets meteorological tables, blank; 4 tin cylinders for papers (very bad, everything rusts in them); Nautical Almanac for 1857 and 1858; charts, Mr. Cooley's; missionary map; skeleton maps drawn up by Captain Speke; table of stars drawn by Captain Speke; account book; portfolio; wooden and tin cylinders for pens, &c.

*Tools.*—1 large turnscrew; 1 hand saw; 1 hammer; 20 lbs. nails; 1 hand vice; 1 hone; 9 hatchets (as a rule every porter carries an axe); 2 files; 9 Yembe or native hoes; 9 Masha or native picks; 1 cold chisel; 1 heavy hammer; 1 pair pincers.

To be followed by 1 bench vice; 1 hand ditto; 12 gimlets of sizes; 1 stone grinder, with spindle and handle 18 inches; 6 splitting axes; 12 augers of sizes; 2 sets centre bits, with stock; 12 chisels; 4 mortise chisels; 2 sets drills; 24 saw

\* A third sextant was forwarded by Admiral Beechey.—Ed.



files; 6 files of sorts; 4 gouges of sizes; 50 lbs. iron nails; 2 planes, with 2 spare irons; 3 hand saws; screws. These things will be useful at the lakes, where carpenters are in demand.

*Clothing.*—The shirts are flannel and cotton; turbans and thick felt caps for the head.

*Books and Drawing Materials.*—Norie; Bowditch; Thompson's 'Lunar Tables'; Gordon's 'Time Tables'; Galton's 'Art of Travel'; Bnist's 'Manual of Observation'; Jackson's 'What to Observe'; Jackson's 'Military Surveying'; 'Admiralty Manual'; Cuvier's 'Animal Life'; Prichard's 'History of Man'; Keith's 'Trigonometry'; Krapf's 'Kiswahili Grammar'; Krapf's 'Kinika Testament'; Amharic Grammar (Isenberg's); Belcher's 'Mast Head Angles'; Cooley's 'Route to Unyamesi Lake'; and other miscellaneous works; 1 paint box complete, soft water colours; 1 small ditto, with Chinese ink, sepia and Prussian blue; 2 drawing books; 1 large drawing book; 1 camera lucida.

*Portable domestic Medicine Chest.*—Vilely made; it is glued, and comes to pieces. Some medicines for natives in packages. I have written to Zanzibar for more quinine, some morphia, Warbeng's drops, citric acid, and chiretta root. This country is a hot-bed of fevers.

*Miscellaneous.*—10 pieces red cloth for presents (3 expended); 3 knives for servants; 4 umbrellas; 1 hank salmon gut; 1 dozen twisted gut; 1 lb. bees wax; 2 dozen penknives; 2000 fishing hooks; 42 bundles fishing line; 2 lanterns (policeman's bull's eye and common horn); 2 iron ladles for casting lead; 1 bousewife, with buttons, needles, thread, silk, pins, &c.; 12 needles (sailor's) and palms; 2 pair scissors; 2 razors; 1 hone; 2 pipes; 1 tobacco pouch; 1 cigar case; 7 caisters snuff; 1 filter; 1 mouth filter; 1 looking-glass; 1 small tin dressing-case, with soap, nail-brush and tooth-brush (very useful); brushes and combs; 1 union jack (this precedes the caravan, in rear the flag of Zanzibar); 10 steels and flints (matches almost useless in this damp air).\*

*F. Galton, Esq.*

VI. — *Explorations in the Desert East of the Haurán and in the Ancient Land of Bashan.* By CYRIL C. GRAHAM, Esq., F.R.G.S., &c.

Read, February 22, 1858.

IN the early spring of the year 1857, on my arrival at Jerusalem, from Egypt, having just concluded a journey of considerable length into the higher and less known countries through which the Nile flows, I began to make preparations for a very extended tour in Palestine and Syria. My object was to become as thoroughly acquainted as possible, not only with the general features of the country, but with all the minute details of the topography. I had long felt convinced of how much might be done by careful research, how many sites which have long since been forgotten might be rescued from oblivion; and that each step we make in our knowledge of the ancient topography of Palestine is of incalculable value, as a subject of general interest to all, but more especially as affording the strongest proofs of the invariable accuracy of the sacred Historian. Dr. Robinson and Dr. Eli Smith were the first

\* A box containing botanical and geological specimens had been sent to the Secretary of the Bombay Geographical Society. For information, since received, of the farther progress of this Expedition, see "Proceedings" R. G. S., vol. iii. —ED.



St. Takwadi

El Hārrah, eastern limit unknown  
(A remarkable District, the whole Desert being covered  
with loose basaltic stones lying close together)

English Miles

*M<sup>r</sup> Graham's Route is coloured*

*Road leading to Busrah on the Tigris*

While for the localized  $\alpha$ , the Reg. of uncorrupted  $\alpha_{11}$ ,  $\alpha_2$  &  $\alpha_{22}$  are  $\alpha_{11} = 1$ ,  $\alpha_2 = 1$ ,  $\alpha_{22} = 1$ .

John Brown

travellers who, uniting great learning with considerable enterprise, devoted themselves to a careful survey of the Holy Land. Of the important results attained by them I need say nothing; their book speaks for itself; but as a traveller in the same country, and one who has visited every portion of the land which they visited, I can give my testimony to the remarkable accuracy of their book, and recommend it to all travellers who intend to devote some time and attention to the study of the geography of the Holy Land. But even their tour was hasty, much of the country they had wished to have seen, west of Jordan, was left unvisited, and the land east of Jordan they scarcely saw at all, except to follow in the beaten track of the few travellers who had already visited those regions.

So although they did much, yet very much more was left to be done, and an ample reward is still in store for any one who will devote some time to the careful exploring even of the lands west of the Jordan.

It may seem strange, now so many travellers annually visit Palestine, that some important advances should not be made every year in our knowledge of the country. But the very system of travelling, as it is generally pursued in the East, is calculated not only to be of no value scientifically, but even rather to mislead. Few travellers devote so long as six weeks to the whole of Palestine, including a journey to Damascus, many only three or four weeks; during that time they are entirely in the hands of a "terjimán," or "interpreter," who knows enough of their language to understand the commonest remarks made to him, and by answering with great readiness to queries about things of daily occurrence, and making a point of always pretending to understand everything, he leads his employers into the belief that he is really well acquainted with the language he professes; whereas in the majority of instances he has but a very confused idea of the purport of their questions, but he always has cunning enough to give some apparently satisfactory answer, which the deluded traveller carefully notes down, and thinks he has obtained some valuable information. In this way any site which you are particularly anxious to find may be discovered without any difficulty. Only ask, or get your dragoman to ask, if there be not a place called "so-and-so" somewhere near, you are sure to be told "Yes!" And when you ask where, the fellow will stretch out his arm and point "over there." Well, if you are satisfied with this degree of accuracy, you put down in your journal for the day, that the long lost site lies in such a position. "We did not visit it, as it was a little out of our road, but it is well known to all the Arabs by its original name." If you are more enquiring, you desire to be taken to the spot. Then you are either led about till it is quite dark, and you are quite tired, and the guide pretends to lose his way, and you

return with still this consolation that you have been near the spot, or else you are at once shown a site which your dragoman and the guide swear by the most solemn oaths to be the spot, bearing the identical name you mentioned. This may appear rather overdrawn, but I think those who have been long in the East will not think it is a caricature of Oriental travel. I have seen so many mistakes made in this way by travellers, and have read so frequently in books of "*Eastern Travel*," things which have evidently been palmed off on the writer—and usually all may be traced to the dragoman—that I feel it is not unnecessary to caution travellers against relying too implicitly on the information of these people, and above all against the practice of putting "leading" questions.

If you want really to obtain information in the East it must be done in a most roundabout manner, and you must learn to become a skilful diplomatist before you can hope to be very certain of success.

I have made these remarks rather with the view of setting travellers on their guard against a very dishonest and designing class of men, who from being well dressed, and so far accomplished that they apparently are acquainted with three or four languages, lead those who are for the first time in the East, and very naturally too, to believe that these dragomans are a very superior class to what they really are, and to treat them with the regard due to educated men. They have taken advantage of all this, and in very many instances the dragoman is master instead of servant. So much by way of preface.

After having travelled very carefully over the greater part of Palestine and over a considerable portion of Syria, I had a very strong desire to see that remarkable country to the south-east of Damascus, called the "*Haurán*"—a country which will ever claim the most solemn interest, being the old Land of Bashan, the country of that most remarkable people the "*Rephaim*," who occupied this land long before Abraham crossed the Desert, and among whom in later times, Og, the king of Bashan, was one of the greatest chiefs.

The first traveller in these parts, in modern times, was Seetzen, a gentleman who was attached to the Russian Embassy, and who in 1805 visited the *Haurán*. He left a short account of his journey in a letter addressed to Baron Zach, the celebrated astronomer of Gotha, in which he speaks with wonder of the old cities he found in the *Haurán*. Seetzen, however, saw very little of the country. He was constantly annoyed by the Arabs, and after a very short tour he returned to Damascus. Four years later, Burckhardt, having heard of Seetzen's discoveries, determined on a more careful examination of the *Haurán*.

He travelled over a great portion of this country, and even penetrated into that wilderness of rocks, of which I shall have to say more hereafter, the "*Léjah*." He reached the mountains which form the eastern limit of Bashan, and even crossed over to the eastern side of those mountains, where he had a full view of the great Desert, in which he saw numbers of ancient towns scattered about, and heard of many more; but great as was his desire to visit them, he found it impossible to accomplish this on account of the Arab tribes who were always sweeping the plain.\* Burckhardt left us a very detailed account of his travels. No work I have yet met with gives so accurate an idea of the Arabs and their customs. He was so thoroughly acquainted with the Arabic dialects, and the habits of the people, that he could frequently pass for a native. His accuracy can almost always be relied on; the only error which is now and then found is in the name of a place, but otherwise the traveller who follows in his footsteps will never have to complain of blunders and inaccuracies. It is wonderful, considering the difficulties he encountered, and the secret and hurried way in which his notes were necessarily taken down, that so few errors should have been made.

He was certainly one of the most remarkable travellers on record. In 1815 Buckingham travelled in the Haurán, but nearly in Burckhardt's track: he wrote a book giving a narrative of his journey. But the most carefully compiled work on this country is that of Mr. Porter,† who was the most recent traveller in the Haurán, having undertaken a journey in January 1853. I had the good fortune of being much with Mr. Porter in the spring and summer of 1857, and to him I am greatly indebted for a vast amount of information about Syria and Palestine. The accounts he gave me of his visit to the ancient cities of Bashan made me more than ever anxious to travel in that country; but what excited my desire most, was the account he gave of the view from the Castle at Salkhad and of the numerous cities which both he and Burckhardt had seen in the Desert far away eastward, which had remained uninhabited for centuries, and which no European had ever been so fortunate as to reach.

I think if you were to tell the most phlegmatic person, that from an ancient castle perched on a hill, and which had been the turning point of all travellers, a wide plain extended, which as far as the eye could reach was dotted over with towns, which were known to have been uninhabited for centuries, but which no living person on record had entered, his enthusiasm would be kindled, and he would be desirous of sallying out on a journey of discovery

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\* Burckhardt's '*Travels in Syria*.'† Porter's '*Five Years in Damascus*.'

into this plain. But when that castle perched on a hill is Salcah, and that hill "the Hill of Bashan," and those cities in the plain "the cities of the Land of Moab far and near," the very cities of which the Prophet spoke when he said, "The cities thereof shall be desolate, without any to dwell therein"—then an irresistible desire comes upon one to go out among these cities, and see the habitations of a once powerful people who have so completely passed away, that as far as we know no descendants of them are now to be found. I made up my mind to use every endeavour to explore this desert and those old cities, being well assured that the results of such a journey would amply compensate for the difficulties and dangers incurred.

I was at Damascus in August, and preparing for this journey in Bashan, when an Arab came one day to my tent. I soon found that he belonged to the "Wulid 'Ali," a great division of the "'Anazeh," who are the largest and most powerful tribe in the Desert. His people were encamped by the lakes east of Damascus, and as I wished to see these lakes very much, I asked him if I should be welcome, were I to go back with him to his tribe. He assured me I should be well received, and so we started off together.

In older maps, the two great rivers of Damascus, the "Barada" and the "'Awaj," are represented as falling into one lake in the plains east of the city, and it was not until Mr. Porter went out into this plain in 1853 that the error was corrected, and instead of one lake, three lakes now appear in our maps. When I reached the encampment, which was by the middle lake, I began to talk about the next day's journey. I wished to go out to some ruins which had been seen east of the lakes by Mr. Porter, but which he had not succeeded in reaching. So all being settled, I started early on the following morning with a party of horsemen for these ruins. The encampment was a very great one, stretching away southwards from where I was for miles, while the whole plain was literally covered with the flocks of goats, and the camels of the Arabs. We rode rapidly across the plain, the Arabs as usual playing and scampering about on their beautiful mares. The three black ruins were before us. The Arabs call them "ed-Diúra," the "convents," but this name they give to most old buildings. It was the southermost of them that I reached first.

This was a square tower, of a shape which I found afterwards to be very common in the Haurán, and built of hard basalt; but within it was a room which really had the appearance of having been once used as a chapel. Coloured plaster was still to be seen on the walls, and deeply cut crosses on the door-posts, so that this building may have once been employed as a convent.

Many fragments of stone and some columns lay about the

building, and the apparent remains of houses, but all completely ruined. I could find no inscription to throw light upon this place.

From the top of the tower was a very extensive view. Immediately to the east lies a chain of hills called by the general name "et Tellúl," and to the south of these and far away in the eastern plain could be seen several peaks, which I was informed were the summits of the chain of hills, which rises from the region "es-Safáh."

The Safáh was again another place of which we know nothing certain. Both Burckhardt and Porter had collected what information they could, but a great mystery hung over it, and, as will be seen in the sequel, their information was not very accurate. I asked about it then from my Arabs. They said they had been there to fight the Arabs of the place, but that it was a bad place, and the people bad people, and that it would be impossible for me to go there in safety.

They spoke to me a great deal about "el-Hárrah," where they said the stones were covered with writing and pictures. I could not ascertain from them accurately where el-Hárrah was, as their accounts differed so widely, some saying it was three—others, eight and ten days' journey off. All gave me the normal answer "Beïd," "far." On leaving this ruin I went to the other two, which were evidently castles, the three forming most probably a line of border fortresses to protect the country against the incursions of the Arabs. After this I went to the other lakes, the northernmost called "Bahret-esh-Shurkiyeh," and the southernmost of all "Bahret-Hijáneeh." There I fell in with the great Arab chief "Mohammad ed-Dúhi," who was on the move. The procession strongly reminded me of that which was formed when Jacob was going to meet his brother Esau. The goats and the sheep went first, then came some of the camels, then the horses and the mares, and the wives and the children, and in the most central and safe position of all was a gaily decked dromedary with a little pavilion on his back in which was placed the favourite wife of the sheikh. The procession was closed in the same manner, a large body of horsemen bringing up the rear.

This is the general order in which a great tribe crosses the Desert. When all is safe they cover an immense space of ground, it being sometimes several hours' ride from one end to the other of the strolling mass. But when danger threatens, of which they have early notice from their light cavalry, the caravan is rapidly concentrated, and before very long they are arranged for battle. It is difficult to estimate the exact number of an Arab tribe, but I should not think that there were fewer than 25,000 horsemen in



this one division of the 'Anazeh.\* This would give a population of about 120,000 souls. The great tribe of the 'Anazeh consists of four divisions, each having its appointed country. 1. The division "es-Saba," who in the spring and summer months are to be found about Tadmor and on the edge of the Desert from near Damascus, as far north as Aleppo. So that all land-traffic between these cities has ceased. This tribe is more numerous and powerful than the Wulid 'Ali.

2. The Wulid 'Ali, who occupy the land from the south of the Saba country to near Salcah.

3. The Rûala, who range from Salcah southwards.

4. The Nejd, who are always in the heart of Arabia.†

The first two divisions migrate every year in the early autumn to the Euphrates. The latter two pass the winter in Nejd. The Saba and the Wulid 'Ali are the pest of Syria. The government is too weak to protect the peasants, and every year some village is deserted, it being impossible for the poor people to live on account of the arbitrary exactions of these robbers. The government gives a large sum annually to these tribes for the safe passage of the pilgrim caravan to Mecca. But notwithstanding the subsidy they take good care once in every four or five years that the caravan is robbed, just to keep up their custom, lest too great security might tempt the Pasha to suspend, or at least diminish the annual payment. But in addition to this the Pasha gives large presents to the chiefs as black mail that they may spare the gardens and vineyards of Damascus. They now encamp within five hours of the very gates of the city, and even the government authorities dare not stir out far, although there is a garrison of nearly ten thousand Turkish soldiers in Damascus. To such a state of weakness and imbecility has the miserable Turkish empire been reduced!

On returning to Damascus I made my last preparations for my journey into the Haurân, took with me letters to some of the most powerful of the Drúz chiefs, with whose help I hoped to succeed in the objects I had in view, and taking leave with infinite regret of the most beautiful of cities and of my kind friends there, I set out one afternoon early in September, and rode to "Deir 'Ali," a Drúz village, situated a little south of the "Nahr el 'Awaj," the Pharpar. The success of my whole journey depended upon the

\* This estimate is far too high. The whole 'Anazeh tribe could not muster more than 10,000 horsemen. Perhaps Mr. Graham means men, not horsemen. I think it would be well to say "25,000 men," or "fighting men."—J. L. PORTER.

† The four great divisions of the 'Anazeh are:—1. Wulid 'Ali; 2. Rûala; 3. Hesauah; and 4. El-Beshar. The Sab'a are a sub-tribe of the last; and the Nejd Arabs, though allied to the 'Anazeh, are now scarcely recognized as belonging to the tribe.—J. L. P.

goodwill and assistance of the Drúzes, who are the present settled inhabitants of Bashan. They live in the very cities out of which, more than three thousand years ago, the Rephaim were expelled, through the help of God, by the victorious Israelites.

Immediately on entering the village, I placed myself under the protection of the Drúz sheikh, who sent his son and an escort of his people with me.

We first visited "Musmeih," described by Burckhardt, and which has been identified with the ancient "Phæneutis," the first station from Damascus, on the old road leading through "Trachonitis." It must have been a city of some importance under the Roman government, judging from the beauty of the temple and other public buildings. I found in this town alone, of all those in the Haurán, specimens of three orders of architecture, viz. the Doric, the Ionic, and the Corinthian, "Musmeih" is built just within the rocks of the Lájah, and, like almost all the towns which are situated on the border of this district, is now uninhabited.

When I set out from Damascus, I had hoped to have penetrated from this point into the interior of the Lájah, which many have attempted to do, but no one with success, as far as I know, except Burckhardt. The difficulty arises from this:—The Lájah is inhabited solely by a tribe of Arabs called "es-Solút," who have almost always blood-feuds with the Drúzes, and to trust oneself under such circumstances among the wild rocks of the Lájah would be madness.\* A small body of men could inflict the greatest mischief on a large army when once engaged in this place, as was the case with Ibrahim Pasha's army, when he made war against the Drúzes of the Haurán.

At the present time I was not more fortunate than other travellers. The Drúzes had feuds with the Arabs in this part, and my escort refused to enter the Lájah. I subsequently accomplished the journey into the interior from "Nejrán," on the south, which in the end was just as well, as Burckhardt had explored the northern part of the Lájah and not the southern part, and it was that portion which I was enabled to explore. For the present I was forced to content myself with skirting the eastern border, and after visiting one by one the numerous towns there, I came to Shuhba, the largest of them all, and the residence of one of the most powerful of the Drúz chiefs. Of the numerous towns on the eastern border of the Lájah there is only one north of Shuhba which is inhabited.

The general appearance of them all is precisely the same.

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\* There are four other small tribes in the Lájah, namely, *el-Medlej*, *es-Selmán*, *ed-Dhohery*, and *es-Sigaleh*.—J. L. P.

Every house is built of the black basalt with which that country abounds; many of the houses are in so perfect a state that they might be inhabited again to-morrow: and, indeed, now and then two or three of the Drúz families will leave the larger towns and form a new community in one of these long-deserted places. All they have to do is to take possession; they have not even the trouble of making a door, for they find stone doors already hung.\* At present the Drúz population is far too small for the country: only a very small portion of the soil is cultivated. If the number of the Drúzes were twice what it now is, not only would Syria gain from the large increase in the amount of corn which would be sent to Damascus, but the Arabs who now periodically visit the "Jaulán" and the "Jedúr," and spoil the whole country, would be kept in check by the Drúzes, and never suffered to pass west of the Haurán. It should be the object of a good Government to induce as much as possible the Drúzes of Lebanon to join their brethren in Bashan, and this would tend in two ways to strengthen Syria, both by checking the Arabs in the way I have mentioned, and, by diminishing the Drúz population in Lebanon, it would diminish the number of those deadly feuds which subsist between these people and the Christians, and the frequent recurrence of which so weakens the country.

On reaching Shuhba, I at once proposed to the chief a journey to the Safáh. He opposed it very much, urging the danger and fatigue of such an expedition; but, finding me determined to go, he sent for the sheikh of the Arab tribe "Ghiás," with whom he was, for a wonder, on good terms. His encampment was ten miles off; so, a bargain being struck with the Arab chief, whose name was "Mutlug," I started off with him at once for his tents. The encampment was just at the edge of the mountains, commanding a splendid view of the eastern Desert and of the lakes to the north, and in the far distance could be seen the green gardens of Damascus and the white top of Hermon. It was an extremely important place for taking bearings, and the more so because no former traveller had been at so eastern a point of the Haurán. From this place I saw numbers of ancient towns which have not yet appeared in our maps. I carefully noted the bearings of them, and from these and the itinerary my map is made, which, although from the want of proper instruments it can boast of no great accuracy, will yet, I hope, be of some service in enabling future travellers to find again the places I visited. For the names I can speak with the greatest confidence, as I made it an invariable rule to get all the names written down, whenever I had an opportunity, by the secretary of the Drúz chiefs. All who know

\* This applies most especially to the towns in the mountains of the Hauran.

anything of Eastern languages will appreciate the importance of this, so many mistakes having arisen from travellers trusting too implicitly to their own ear, which may easily be deceived with regard to Semitic radicals.

From this encampment our arduous journey began. The chief sent four Arabs in advance to act as scouts, for the country through which we had to pass lay in the midst of the great enemies of the "Ghiás," the Anazeh, while Mutlug himself and six men accompanied me. We were all mounted on dromedaries, each animal, besides carrying two of us, being laden with two skins full of water, for we could expect to find hardly any water in the Desert.

On our way we passed the towns which I had seen from the tents, and several other ancient towns besides which had not been noted before. The most important one was "Malkiyeh," near the edge of the Desert. On the wall of a public building there I found a Greek inscription, from which it appears the Greek name was likewise "Malkaia."

Of the others, I should mention "Dúma," "Theimeh,"\* and "Torla," not as containing any interesting works of the later rule, but as presenting some of the most perfect examples of the old houses of Bashan. On reaching the foot of the mountains, I found myself on a fine plain covered with shrubs, the soil as rich and naturally fertile as any in the Haurán, although for centuries it has remained untilled, but which, if cultivated, would no doubt produce the same fine crops which make the Haurán still celebrated as the granary of Damascus.

But we soon came to a most curious break of this fine land, for we entered upon a part where suddenly the whole plain became covered with loose basaltic stones, and in such numbers and lying so closely together that the dromedaries could hardly make their way across them. "Here," said my Arabs, "begins el-Hárrah." "And how far does it extend?" I asked. "Oh, for many days," said they; and, as I afterwards had reason to believe, this region extends eastwards five days' journey, while it is from a day to a day and a half's journey in breadth, or from north to south. Throughout the whole of this strip the plain is covered with innumerable stones, rounded like boulders, but all of basalt. The name "Harrah," which this region bears, probably comes from the root "harr," heat: a similar tract is known by the same name in Mesopotamia, and indeed in many other parts of the Desert. We continued to travel all that night, in order to avoid observation as much as possible. At daybreak we came to some unimportant ruins, and then, after making a short halt, we pro-

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\* Probably the "Bezeine" Burekhardt heard of.

ceeded to the southern border of the Safáh. As we approached, a great chain of hills opened to my view, the southernmost of which was the only one known to Mr. Porter, and marked in his map as Tell es-Safá (the name should be written Safáh). The region called "es-Safáh," from which the chain rises which is called "Tellúl es-Safáh," has, I suppose, few parallels. It is a volcanic district, or should rather be described as a volcanic island, rising abruptly out of the Desert. Its breadth is in some places fifteen miles. The appearance it presents internally is most remarkable. If we imagine a vast quantity of molten metal to be confined in some vessel, and its surface violently agitated by some powerful agent, and while in that state suppose the mass suddenly to be cooled, then the appearance which the surface of the metal may be conceived to assume would probably be most nearly exemplified in the wild and savage aspect of the Safáh.

It resembles no other formation that I am aware of except the Léjah, in the Haurán, and both these districts resemble more nearly the appearance presented to us by some of the volcanic regions in the moon than anything we have on our own globe.

We stayed but a few minutes at the southernmost point of the Safáh, and then continued round the border and began coasting the eastern side. We had not gone very far when my attention was attracted by some marks cut in one of the large basaltic stones which lay loose in our path. On examining it more closely I detected what I took to be characters, and carefully copied them down. A little farther on I found a similar stone, with a palm-tree engraved on it, and likewise an accompanying inscription. I was now in great surprise, not only at finding inscriptions at all in this desert region, but in so strange a position, on the loose stones lying on the ground, and in a character to me totally unknown. It will readily be conceived how great must have been my excitement and how diligently I sought for more inscriptions. It was some little time before I found another, and then again a solitary one, so that I began to imagine these were stones on some ancient road, and marking the distance between stations. While I was speculating upon this, and where the city might be to which the road led, we rounded a point, and a place built of white stone stood before me. It was the more startling, because nowhere near is there any white stone to be found—all the stones in that region being black. The town which I now had before me was similar in most respects to those of the Haurán, being built entirely of stone, and to all appearance of the same high antiquity with the cities of Bashan. The greatest object of wonder in this place was a large building of white stone, consisting of a square tower at the south end, surrounded by a strong wall, with turrets at each of the corners.

This building, whatever it may have been intended for, was unfinished; but so fresh did it appear, that the workmen might have left it yesterday. That it was more modern than the rest of the town, not only does its architecture testify, but in the tower I saw many stones which had evidently been employed in some former building: amongst others some curious ornamental carvings and a figure of a lion, which bore marks of very high antiquity. I was not so fortunate as to find any inscriptions in this place, although I sought carefully for them. I asked the Arabs if they had any traditions about when and by whom this place had been inhabited. All they could tell me was that it had been inhabited up to the time of Tamerlenk, but that this warrior had driven all the inhabitants away and destroyed their city. The only name they have for the place is "*Khirbet el Beida*" (the white ruin).

On the eastern border of *es Safáh* are four other ruined towns; but in none of them could I find any inscriptions. They are all alike in style, but inferior in preservation to the old towns of *Bashan*. I should remark that for a certain distance the stony district gives place to a fine plain, on which is not a single stone, and it is just by this rich land that the five towns are situated. According to the Arabs, no other ruins are found about the *Safáh*.

I originally intended to follow the *Safáh* to its northernmost limit and then to go to a ruined town the Arabs told me of, called *Seis*, the approximate position of which I was able to mark on the map, as the hill under which the town lies could be distinctly seen from the *Safáh*; but our scouts having brought us word that a party of our enemies were in that direction and not far from us, and that almost certainly they belonged to a portion of the tribe encamped at *Seis* on account of the water there, I was very reluctantly obliged, after following the *Safáh* for some distance, to give up exploring the whole of this extraordinary region. I was the more desirous of visiting *Seis* because the Arabs told me it was built of "red" stone. I have already said something about the general appearance of the *Safáh*; but I should add something more about its internal structure. The hills which rise from the *Safáh* are at distances varying from four to ten miles from the edge; from the foot of these hills to the border we have this sea of basalt intersected with cracks and fissures, sometimes 20 feet in breadth and many more in depth. These ravines are quite impassable, and frequently such a fissure has to be followed a very great distance before it becomes possible to cross it.

Here, as in the *Léjah*, those who know the district may remain in safety and defy the most powerful foe. It was in an attack on the Arabs with whom I now was, that *Mohammad ed-Dóli* got entangled among the rocks of the *Safáh* and lost a great number of his people: two of his brothers were killed, and he himself lost

the use of his right arm from a spear wound. The Safáh is even more horrible than the Lájah, for there, at least, are many patches of good soil, while here I could not see a single spot where there was any soil. Some "botm"\* trees grew here, but I think no other shrub. The hills form a long range. I counted 19 distinct peaks; the highest of them may be about 600 feet above the level of the plain. There are no springs, and the only water here is collected in hollows from the rains. Four or five tribes of Arabs frequent this region as soon as the rains commence; but in the hot season they are forced to go elsewhere in search of water, and during these months the Safáh is uninhabited. These tribes are always carrying on war with the 'Anazeh, who spend the summer about the Haurán. They happily have no fire-arms, their weapons consisting of a spear, some 18 feet in length, and a scimeter. Amongst the Rúala Arabs several of the chiefs wear a coat of mail under their dress, which saves them from any ordinary wounds, and so makes their enemies believe them to be under the special protection of the "Ján." I know one Drúz chief who has a suit of mail.

Eastward of where I now was were to be seen four hills—the northernmost "Tell Um el Jeríd," the southernmost "Tell 'Ozda';" and I now resolved on striking across to these hills, being curious to reach the summit of one of them to have a view of the Desert farther east, and to look over a waste which had not been passed for many a century by any European. Nothing could be seen but one vast plain, bounded only by the horizon, and which reaches, it seems, without a single break, to the Euphrates. It was, indeed, a view which made one reflect: all around me was desolation, not a creature of any kind to be seen, not a tree, not a shrub, but all about me were the traces of a people who long, long ago had gazed on the same plain, but who had now so completely passed away that the question of their very name and race is one of dispute. I thought much on the curious characters I had found on the stones, and felt very anxious to find more, with the hope of some light being thrown on these inscriptions. I now turned my attention entirely to discover some more of these engraved stones. I went southwards, and presently, to my delight and astonishment, I came upon, not one stone, as before, but a space where for two or three hundred yards in circumference every stone had some mark and bore the representation of some beast or other thing, and almost invariably the figure or picture was accompanied by an inscription in this mystic character. It was night, and my Arabs lay asleep. I could not rest, my mind was so occupied with what I had seen. I wandered about among these old stones: all was still, and as the bright light of the full moon shone on the figures and letters cut

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\* *Pistacea terebinthus*.—J. L. P.

in the stones, I imagined almost that I was in a dream and had been transported to some wonderful place of the dead. One thought succeeded another as I gazed on these marvellous stones, and tried to picture to myself what people they were who centuries ago had lived here and had employed themselves in carving these curious symbols. What did it all mean? And when the early light of day appeared I began to copy these writings, fatigue and hunger being quite forgotten in the intense interest of the scene.

As the sun rose a little above the plain we prepared to depart, the aim of our journey this day being a wádi in the desert eastwards. I came upon a succession of these places where all the stones bore some inscription: sometimes they would be near the ruins of some ancient place, but in many instances they were quite alone in the stony Hárarah. I found east of the Safah another curious building, called "el Kníseh" (the church)—a name which the Arabs universally give to any very old building; but no sign whatever of Christian worship, no cross or other emblem, was to be seen here. The Arabs had an absurd tradition about this place; but it is not worth mentioning here.

While continuing my journey southwards, I came to a curious road cut right through the Hárarah. It was not paved, but as far as I could see ran in a straight line. All the stones had been carefully picked out and piled up against the side, so that a fine wide space was left for the road. Its direction where I saw it was north-east and south-west nearly, and led probably to Palmyra. I followed it for some distance, and was informed by the Arabs that it went to "Deir en Nasráni," which I subsequently found to be true, so that probably this was the high road leading from Bozrah to Palmyra in the flourishing days of these two great cities. Presently we were alarmed by the sight of distant camels, so we turned off eastward and at length came to a wádi, where were again several remains, known as "el-Warrán." Among some ruins I got a curiously carved red stone, which is now in the museum of the Royal Asiatic Society. Some imagine it to be an idol; perhaps it is. That was the idea of my Arabs, who called the wádi "wádi es-Senam." It is worth while for those who are curious in such things to look at this stone. I should have much liked to have followed this wádi for some distance, as I had reason to suppose that other remains were to be found; but water had already begun to fail us, indeed we had lost one dromedary from fatigue, and so I was compelled to make again for the Haurán. On our way we passed close to Tell 'Ozda, a solitary hill, a little to the east of Tell en Nemáreh, and then we entered a broad river bed, in the centre of which were situated on a high mound some ancient buildings. These again closely resembled those old houses of Bashan,



with the beams of stone and doors still perfect. One of the houses, the most perfect one, had long been venerated by the Arabs of the Desert as the residence at some remote period of a lady who bore the gentle name of "Nimreh bint en-Nimúr" (Panthress daughter of Panthers). Her shrine was decked after the Arab fashion with tattered garments—for in this way do the Muslems pay homage, when a garment is in such tatters that it can no longer be worn at all; they liberally adorn the sacred shrine of some celebrated derwîsh with the remnants of their filthy rags, and those who know the Arabs must be well aware how long a derwîsh may wait before he may hope to get these cast-off clothes. Over the door of this lady's house was an old inscription, but quite illegible; I could not even make out in what character it was written.

At en-Nemáreh I found the greatest number of inscriptions on the basalt stones I had met with anywhere. I suppose there were thousands of stones bearing the marks of figures of animals, some tolerably well executed, others again so badly done, that I almost began to think that at these places the schools had been held, and that I had before me the copy-books of children who had been dead perhaps two or three thousand years.\* We were much disappointed in finding no water here: all the wells were dry, the summer being just at its close, and the early rains had not yet begun; and as we were now in distress from thirst, we followed the wádi a considerable distance, hoping to meet with some hollow where a little water might still be left. We at last got some green stuff left from the winter rains, with which we were fain to be contented, and having filled our water-skins with this precious liquid, we started for the Haurán and reached the encampment of Mutlug in twenty hours.

The next morning I rode off to Shuhba on Mutlug's favourite Nejd horse which he had taken in a battle from the 'Anazeh, and was welcomed and received with all honour by the Drúz Sheikh "Fáres." Thus ended this portion of my journey, the results of which were:—

1. The investigation of the exact nature of the region es-Safáh, which had never before been visited.

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\* Since writing the above, I have had time more carefully to examine these inscriptions, and to compare them with the characters of other languages which could be in any way historically connected with this country. I do not find any alphabet which contains all, or even the fourth part, of the signs which I have; but the character which most nearly approaches to these is the Himyaritic character. There are possibly thirteen—certainly ten—signs which both languages have in common. Whether in both instances the value is the same I have not yet been able to determine; but even the fact of ten being absolutely alike in each is not likely to be the result of a mere coincidence. However, I refer the reader who is interested in this subject to the 'Transactions of the Royal Asiatic Society,' in which my inscriptions will be published, together with some remarks on the method by which I have attempted to decipher the language.

2. The discovery of a chain of hills of some length rising out of the Safáh.

3. The discovery of the tract el-Hárrah with its ruins and inscriptions.

It will here not be out of place to say a few more words about this country east of the Haurán, of whose history, as far as I am aware, we know hardly anything. The accounts in Scripture are confined to Bashan, and the eastern limit of this country is frequently mentioned to have been "Salcah," now called "Salkhad," while the range of mountains now known as "Jebel ed Drúz" form the geographical limit of Bashan. Among the later historians no mention seems to be made of any towns east of the Haurán; and even the Arab historian "Abulfeda," who is so accurate in describing the geography of Syria and the adjoining parts, never mentions any of these Desert towns.

So I think it probable that they were no longer inhabited in his day. Again the absence of all Greek inscriptions, which are found in such profusion in all the villages of the Haurán, seems to argue that this country never came under the dominion of the Greeks. The houses are of the same solid construction in many instances as those of Bashan. But the most remarkable fact in connexion with this country is that of finding inscriptions in a character which, whatever it may be, is certainly no recognized form of any Semitic language.

Whether this country once was tributary to Phœnicia, or whether we have on these stones inscriptions of a far earlier period, traces perhaps left by the old Rephaim themselves who first occupied this land, is at present mere matter for speculation; but should these inscriptions some day be deciphered, we may hope to have some light thrown upon the history of a country of which we seem at present to know nothing, and of a people who may have been perhaps the earliest emigrants out of Shinar, and the original founders of the cities of the Land of Bashan and of Moab.

On my return to Shuhba I found the Drúz chief sitting amongst his people in one of the old temples of the place, which he made his summer residence. A grand feast was prepared in honour of my safe return, and all the men of the place dropped in, one after another, to make their Selám to me. The customs of the Drúzes are more strictly Oriental than those of any race in this part of the East, excepting always the Arabs of the Desert. Those who wish to see the same practices going on, and the same ceremonies in daily observance, of which they read so repeatedly in the Old Testament, can nowhere do so with the same advantage as amongst these Drúz people and the Arabs of the Desert. The former of these represent most perfectly the more civilised and polished population of the towns, and the agricultural population, who while they

are powerful and able to resist oppression, have yet the will and the wisdom to cultivate the land. Their religion and their difference of race having made them very exclusive, they have been altogether unaffected by the influence which has acted on the Mohammedan population. Not that amongst the Muslims any great change has occurred: on the contrary, even in such a city as Damascus—where commerce has so long flourished, and consequently brought the people in contact, more or less, with different nations—you might imagine that you were living in the reign of one of the Ben-hadád, so exactly does every little point of outward form agree with what we read of these times. But although no European element can be detected amongst the Muslims of Damascus, yet amongst the higher classes you can perceive that a certain Turkish or Tartar element has crept in which takes off a little from the perfect similarity which would otherwise subsist between the old Semites and the present Semitic population of Syria.

Among the Drúzes such is not the case, nor amongst the Arabs of the Desert. These are totally unchanged. They have the same black tents,\* the same curtains to fence off the woman's portion of the tent, the same period for crossing the great Desert, the same order of march, the same feuds, and even the same arms and utensils that they had in their father Ishmael's day.

Every other race has, during the same number of centuries, progressed up to a certain point, and then retrograded; these alone have remained stationary, they never became more civilised or more learned than their ancestor, and now they are the same savage, wild, and restless people, the terror of their brethren, that they were in the olden times of the land of Israel. The Arab is a "wild ass" of a man.† So perfectly is the prophecy fulfilled!

Hospitality is really carried on to a great extent amongst the Drúzes; each village has its sheikh or hereditary chief; he is in many instances a man of great wealth, being the owner of immense numbers of sheep and cattle. My host at Shuhba, "Fáres 'Amer," was the wealthiest chief in the Haurán, and while I was there, each day he killed no less than four sheep, which were served up whole, with rice and cakes and other luxuries. I cannot farther interrupt the narrative of my journey to give more detailed account of the customs of these Drúzes, although I would gladly bring more to the notice of my countrymen, and Europeans in general, this remarkable and interesting people.

I remained three days at Shuhba, making very long excursions each day. I rode to "Shuka, Hít," and "Tell el Khaledíyeh," and

\* Canticles, i. 5.

† See Gen. xvi. 12, where in the original stands, "And he will be a wild-ass man."

the ruined towns "Táala," and "Ta'alla," and "Bathányeh," and paid a visit to Sátam, the chief of an Arab tribe, who was a noted warrior. He had killed more men in the war with Ibrahim than any other individual. He had during many years been a bitter enemy of the Drúzes, but since "Fáres" had become so powerful he found it his interest to forget the past, and so now Sátam and Fáres and their people were "sawá sawá," or one people, and the chiefs brothers. I learned a great deal from these people, who had never before been in contact with any European, and the curious questions which they asked me would astonish the English reader. From Shuhba I determined upon going to Nimreh which had not been visited, and then among the mountains down to Salcah. This would be almost all of it new country. I sent one of my servants with my baggage straight to "'Ari," and this place I was to reach, if all went well, in four days.

There I was in hopes of arranging, through the influence of the Drúz chief, "Ismáíl el 'Atrash," a journey among the cities east of Salkhad, which could only be effected from 'Ari, because Ismaíl alone of all the Drúz chiefs was on friendly terms with the great chief of the Rúala Arabs. So I started from Shuhba accompanied by four Drúzes and my Æthiopian servant,\* all of us well armed and well mounted. We proceeded along the bed of a river which rises in the mountains of the Haurán, and flowing down into the plain near Shuhba, just skirts the edge of the Léjah and ultimately falls into the southernmost of the three lakes east of Damascus, the Bahret Hijáneh. This river bed, which in summer is always nearly dry, is called by the general name of "Wádi Liwáh," but in the upper part of its course above Shuhba it is specially called "Wádi Nimreh."

The rocks on each side of the Wádi Nimreh rise high; on two of them I saw ruins of ancient places, but they were too much out of my way for me to visit them. On reaching Nimreh, an old town built on a bill just above the Wádi, I found that the river bed had branched off into two parts, one continuing nearly in the same line which I had followed from Shuhba, the other going towards the south-east. The source of each of these branches could not be far distant, but I did not visit the actual spot where either of them took its rise. In Nimreh I found nothing of particular interest. The houses resemble those which are found throughout the Haurán. I saw a Roman temple, but no inscriptions. The population of this and all the towns in these mountains are Drúzes. On leaving Nimreh I proceeded for a short distance southwards up a valley which joins the Wádi Nimreh, and then going east

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\* He came actually from Napata, the capital of Candace, Queen of the Æthiopians.

I gradually ascended the mountain range. Here, for the first time since I had been in the Haurán, I came upon springs; numerous little streams trickle down the western side of the mountains, and much grass grows near their course. These mountains are overrun by the flocks of the Arabs, who during the summer months encamp in the plain below. A year ago not a single town among the mountains south of Nimreh was inhabited, but in August of last year, two months before I was there, and immediately after the harvest was over, a few Drúzes made settlements in two places, "Bshénnef" and "Busán;" the first of these I made my sleeping quarters on the day I left Shuhba. Bshénnef is beautifully situated on the border of a wild glen which leads into the great plain below, and down which a winter torrent runs which makes its way far into the Desert, and is the same with the Wádi en Nemáreh, which I mentioned before.

Bshénnef must have been a place of considerable importance, not only judging from the house-doors, which were more than usually ornamented, but also from a beautiful temple which I saw there. I found many inscriptions deeply cut, in Greek, and all of which I copied. In this town was an interesting example of how perfectly the old houses of Bashan are adapted to receive new tenants. Two months before, the town was uninhabited, and like all those in that part, had been without inhabitants many a long year: all that the Drúzes had to do was to throw down a piece of matting, or those who could afford it, a piece of carpet, and to bring with them the few cooking utensils of which they had need. This formed the entire furniture of the houses; they then shut their stone doors and were secure against any sudden attacks of the Arabs. As soon as the early rains fell they would begin to sow; as the corn ripened their difficulties would increase: they were living on the very edge of the Desert, and this small body of men would have to defend their families, their flocks, and their corn against the Arabs. The next place of importance, which was likewise quite a new settlement, was "Busán." This is a still larger town than Bshénnef; the streets are very regularly built, and the stone houses perfect. It commands an extensive view of the Desert, which was especially interesting to me, as I could see a portion of the Hárrah like a black mark in the plain, and could to some extent combine the observations I had made in the last journey with those made in the present journey.

The Drúzes at Busán told me that they had already experienced great difficulty from the Arabs, especially from the 'Anazeh, whose chief encampment was at 'Ormán. From Busán I went to "Sáli,"\* another very large town on the mountain. In one of the

\* Spelt *Saleh* on Porter's map; but the orthography in the text I have from the Imám of the Drúzes.

streets is a large public building, walled all round with very high walls, but bearing no inscription, so I could not say for what it had been intended. Some of the finest springs in this part are at Sáli, which are a great attraction to the Arabs who come to drink here and give their camels and their flocks drink.

I now struck across south-westward for "*Schwet el Khudr*." This portion of Bashan is very beautiful. One after another the narrow green valleys opened before me as I crossed the mountain chain, and here began the forests of oak, which are so often mentioned in the sacred writings, but which now only exist in a small portion of Bashan. All the western side of the mountains from near "*Kunawát*" southwards is covered with these beautiful trees, but nowhere else in all the Haurán are they found. They may indeed well be called "*the beauty of Bashan*." All the plain of the Haurán is destitute of trees: there is nothing to relieve the gloom of these black towns. Other trees too are found in this part—the wild pear, and a kind of thorn which bears a white fruit, larger than, though in appearance not unlike, the Siberian crab, called in Arabic "*Dhaghúr*." The oak is an evergreen, and its leaves prickly: there are two kinds, the one called "*Sindyán*," the other "*Mellúl*," corresponding, perhaps, with the "*elah*" and the "*allon*" of the Hebrew. There is likewise a general name for all oaks—"Balúteh," or acorn tree, "*balút*" meaning an acorn. The acorns of the Bashan oaks are immensely large, although the tree does not usually attain a great size. The wood seems to have been greatly valued in old days; it was always used when great strength was required. Of this wood the oars of the Tyrian galleys were made,\* although forests of oak were to be found within a much shorter distance of the coast of Phœnicia, about Nazareth, and all that part of Palestine; but even now the finest oaks by far are those of Bashan. "*Schwet el Khudr*" had been visited by Burekhardt.

Leaving this city a little to my left I came to "*Hebrán*." Hebrán is a very ancient town, and although we do not seem to find it mentioned in the Old Testament, it is doubtless of the same date with Bozrah and the other very old cities. It is within an hour and a half of the foot of the peak called "*el Kuleib*," whose summit must be about 6000 feet above the level of the Mediterranean; but it rises already from such high land that it has the appearance at Hebrán rather of a hill than of a mountain, although from the plain near Bozrah it looks very high and is a most important point for taking bearings. The Kuleib is a mountain of great beauty, cone-shaped, like the summit of Etna, and covered with a forest of oaks to its very top. This is possibly the hill spoken of by

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\* Ezekiel, xxvii. 6.

David as "God's high hill, even the hill of Bashan," and the "Mons Alsadamus" of the Romans; but more probably both these names applied to the whole chain now called "Jebel ed-Drúz," or "Jebel Haurán." I should mention that Burckhardt, and most travellers who succeeded him, have called this mountain "Kelb," or "Kelab el Haurán," instead of "Kuleib el-Haurán," making a mistake in the radical letters. The former would mean the "dog," the latter the heart, or little heart, of the Haurán.\*

Immediately at the foot of this peak is an ancient town called "Kufr," remarkable on account of the high walls which surround it. The town gates, composed of two large slabs of stone, nearly 9 feet high and a foot or more in thickness, are still standing uninjured. I slept, I should say I passed the night, at Hebrán. I had not slept for many days; and the next morning early I mounted my horse and rode off to 'Ari, passing on the way through "Afineh" and "Mejeimar." The sheikh of Hebrán "would" follow me, although I tried to dissuade him, and for many days he would keep with me. He was reckoned a brave man, and had killed many a Turk, I was told, in his day. On reaching 'Ari I found the sheikh ready to receive me, and my servant and baggage safely arrived, but I heard bad news. The 'Anazeh were just on the move for the Nejd in Arabia; and the Drúz chief told me, and I well knew it to be true, that however much he might have presumed upon the circumstance of the truce with the Arabs, to make an arrangement for me had they been stationary, now that they were moving there could be no guarantee for my safe return, and they might rob me with impunity, for being once away from the Drúz country the people could no longer retaliate upon them.

I then proposed to the chief to accompany me himself with a strong party of his Drúzes. He said there would be great objections to that at present, but if I could wait ten or twelve days he would try and serve me. I was determined on no account to give up the attempt, I had so resolved on exploring east of Salkhad; and I agreed to wait a few days if he would then promise to go. He swore that he would be at my service with some of his most determined followers, and with this assurance I thought I would in the mean time visit Bozrah, and try to reach some of the cities south of Bozrah. This I did against his advice. He urged me not to go, for, said he, Bozrah now is surrounded by Arabs. and they are our enemies, and you will be robbed of everything. I could not give up so interesting a journey. Bozrah was one of the most important places in the whole country, and moreover I had a strong desire to go to "Um el Jemál," a city which Burckhardt so much wanted to reach; and besides, dangers

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\* Mr. Porter was the first traveller who pointed out this mistake.

of this kind are so often overrated: if you do not venture sometimes in that country you will end by doing nothing; so off I started, looked in at Mejeimar and two other old places, and then the great city was before me. On approaching I found indeed a tremendous number of black tents; the whole place was surrounded by them; there must have been several hundreds of them. The Arabs soon spied me, and I saw horsemen coming towards me from all directions. The first two who rode up and screamed out a hoarse "Who are you?" were of the tribe es-Serhán. I told them I came to see their chief, and was at once conducted to his tent. The object uppermost in my mind was how to arrange my journey to "Um el Jemál," and to effect this a good deal of diplomacy had to be used. As the order of proceeding is always more or less the same in effecting a bargain with these people, and as it will give some insight into Arabian manners, it may not be uninteresting to give in detail the account of the transaction with the sheikh at Bozrah.

As a preliminary measure, I sat and stared, and drank coffee and stared again, and looked very grave. Presently some remarks would be made. I answered as many questions as I cared to answer, and the rest I evaded. At last I let it drop from me, but as if I had been very indifferent about it, that I rather wished to see "Um el Jemál." The sheikh then said, "I will go with you." "Very well," said I, "in truth will you?" "Alla rasi" (on my head be it), said he—this is the usual asseveration of the Orientals—at the same time placing his hand on his head. Then I sat and looked grave, and something else would be talked of. You must never appear eager if you have an object in view. Presently the sheikh himself again introduced the subject. "When will you go?" said he. "To-morrow," said I; "but how much do you want?" "Nothing, O my Lord, nothing; for the love of you I go." "But," said I, "for the love of you, O sheikh, I would wish to give something." Well, he would go on swearing that he had loved me so well, he had never met any one before whom he loved so well; he would go for nothing. Several hours had now elapsed, and then he thought that, all preliminary compliments having been fairly gone through, when I at last desired he would name a price for himself and his people, he *did* name one. "My Lord," said he, "500 ghaziye<sup>h</sup> will never repay me. I wish nothing for myself; it is for my people I ask, and they will never be repaid; it will be a dead loss to them; they risk their own lives and their beasts' lives, and no doubt some camel will die by the way; so, for the love of you, I will go for 500 ghaziye<sup>h</sup>. For no one else in the world would I go at any price."

Now, 500 ghaziye<sup>h</sup> equals 100*l.* sterling, and I had made up my mind to give at the utmost 500 piastres, or about 4*l.* 3*s.*



So, when he said this, I held my tongue, and thought of the story of Abraham and Ephron the Hittite.\* The account given in the book of Genesis of this transaction is, like so many others in the Old Testament, an exact portrait of a scene of daily occurrence in the East. Abraham, a man of great wealth and great influence, lost his wife. He wished to buy some land to bury her with great honour. Ephron of Hebron possessed the most desirable piece of land. Abraham sends for him, and asks him to name a price. The Hittite finds the old man overcome with grief at the death of Sarah, and little inclined to be troubled with the affairs of every-day life, and he knows that he can get any sum he likes to ask, being well aware that for the purchase of a burial-place for his beloved wife the old chief will never bargain. To Abraham's question he gives the regular Oriental answer, "O my Lord, it is thine!" Abraham, however, wishing to finish the matter at once, and not being disposed to go through much form, says, "Nay; but mention your price." Upon which Ephron *did* mention a most exorbitant sum, which Abraham immediately paid him before witnesses.

Well, to return to my Arabs. After remaining silent some time the chief at last said, "What will you give?" "Two hundred piastres" (=400 pence) said I. This immediately created great sensation; they had hoped to have got at least ten times that sum. A general murmur arose, and the sheikh, jumping up in indignation, said "Ana felláh?"—Am I a peasant? Do you take me for a felláh? One by one the Arabs left the tent, and I remained alone, knowing very well, if I remained firm, what the ultimate result would be. In about an hour one came in again, and, squatting down opposite to me, began, with many oaths, to tell me there was no one like me; but that, by the beard of the Prophet, I had offended the sheikh, who would have done anything for me: "but," said he, "if you offer him 400 ghazi (80*l.*) he will forget it all, and you will be brothers." My answer was that I did not want him to go if he did not like it. I valued the journey at 200 piastres, and if he would go for that, well and good. He then left me in apparent displeasure, swearing and muttering all kinds of oaths. A succession of such visits took up the rest of the day, every new envoy mentioning a lower sum than his predecessor. Some would try what threats would do, and tell me I was in the power of the chief, who could take everything from me, if he chose. Others, old men of the tribe, with hoary beards, would advise me, in a friendly way, to comply, while all concurred in never leaving any flattering speech untried which they thought would operate upon me. I still remained firm to my

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\* Gen. xxxiii.

200 piastres, reserving to myself, as the last compromise, an extension of the offer.

At last it ended by the chief coming in himself early the next morning: he told me he loved me as his own son, and could not take anything from me, but that if I gave 1000 piastres to his people he would start with me immediately.

This was the time for offering more, and at last it was arranged that for 400 piastres he should supply dromedaries, and we should go next morning. He then bound himself by all kinds of oaths to keep his bargain.

I spent the rest of the day in inspecting the beautiful remains of the city of Bozrah, of which I shall not give any account, because several travellers have already described it; and a very accurate description of the city, with a sketch of its history, is given in Mr. Porter's *'Five Years in Damascus.'* I will only say here that it is mentioned in the Old Testament among the cities of Moab, although it is not to be confounded with another city of the same name in Edom, and not far north of Petra, which is mentioned in Isaiah, and was visited by Burekhardt.

This latter city is now called "Buseirch," or Little Bozrah, the form Buseirch being the Arabic diminutive of "Busrah." There is likewise a third Bozrah situated on the Tigris, and near the Persian Gulf, which was a very important harbour and place of commerce; and to this city an ancient road leads directly across the desert from Bozrah of the Haurán.

The country I was now about to travel was again perfectly unexplored ground. Some of the nearer cities which lie in the plain had been seen from the Castle of Bozrah, and some of the names noted down; but no one had yet visited any of them, so I looked forward with considerable interest to this portion of my journey.

I left Bozrah early in the morning, accompanied by three chiefs—for I had forgotten to mention that there were three tribes around the city, and it was necessary to have a chief of each tribe to be secure from the attacks of the others. They were the chief of the "Serhán," a very disagreeable and haughty fellow, who styled himself "Emir es-Serhán," or prince of the Serhán, and he treated me treacherously; a sheikh of the tribe "es-Serdiyeh," and a sheikh of the "Beni-Sakhar." The two former were mounted on mares, I and my servant each on a dromedary; the man of the Beni-Sakhar behind me, and a black slave belonging to the chief of es-Serhán behind my servant.

Immediately south of Bozrah is some of the richest land in this part of the East—such a contrast to the journey in el-Hárrah. The first town I came to was on the edge of a wádi, called "Wádi el Botm," and known by the general name only of "ed-Deir."

I wandered about amongst its ruins, but found no inscriptions;

only on very many houses were simple crosses cut in the dark stone. In all these towns I found square towers, not unsimilar to those at Palmyra, and probably like them were used as burial-places. There were large tanks about this town (or "birkeh," as they are called in Arabic), in which the rain-water was collected, but they were then quite dry. After ed-Deir, the next place of importance was "Um es-Semák," a much larger town than ed-Deir, but equally devoid of inscriptions. Next came "Um es-Sérab," then "Deir el Kaffir," close to which runs the old Roman road, which led from Bozrah to "Ammán," the ancient capital of the children of Ammon. This is a continuation of the road which leads from Damascus to the ancient Phœneutus, and then through the Lájah to Bozrah. It is a broad road, and well paved. The Arabs take notice of it, and call it "Derb en-Nasráni," the Christian's road. These people entertain the general belief that everything which was anterior to the time of Islám, was done by the Christians.

In an hour more I had before me an enormous city, standing alone in the Desert, and known by the name of "Um el Jemál," most probably the "Beth Gamul" of Scripture—the Hebrew name meaning "the house of camels," and the Arabic name, by a transformation which is very common in Semitic names, "the mother of camels." The ruins in this Desert abound in the prefix "Um," mother, while on the mountains of the Haurán the prefix "Abu," father, is as frequent. There are other reasons, besides the mere coincidence in names, for supposing this city to have been the ancient Beth Gamul. It will be found, on referring to the prophecy about Moab, that Beth Gamul, Kerioth, and Bozrah are mentioned together. Bozrah and Kerioth we well know; they lie within two hours of each other, and by far the largest city near them is Um el Jemál.\* This is, perhaps, among the most perfect of the old cities which I saw. It is surrounded by a high wall, forming a rectangle, which seems to inclose as much space as the walls of the modern Jerusalem. The streets are many of them paved, and I saw here what I do not think I saw anywhere else, open spaces within the city such as we should call squares. There were some very large public buildings; but although I diligently sought for inscriptions, I only found three: one of them in red Greek letters on a large tower, which I fancy was a prison, or, perhaps, in later times a convent, as there were many red crosses upon it. The houses were some of them very large, consisting usually of three rooms on the ground floor, and two on the first story, the stairs being formed of large stones built into the house-walls, and leading up outside. The doors were, as usual, of

stone : sometimes there were folding-doors, and some of them were highly ornamented.

On reaching this city (as indeed it was my practice in all such places) I left my Arabs at one particular spot in charge of the dromedaries, and posted sentinels on the towers to watch the approach of any foe ; then, taking my rifle with me, I wandered about quite alone in the old streets of the town, entered one by one the old houses, went up stairs, looked into the rooms, and in short, made a careful survey of the whole place ; but so perfect was every street, every house, every room, that I could almost have fancied, as I was wandering alone in this city of the dead—seeing all perfect, and yet not hearing a sound—that I had come upon one of those enchanted places that one reads of in the ‘Arabian Nights,’ where the population of a whole city had been petrified for a century.\* I do not wish to moralise too much, but one cannot help reflecting on a people once so great and so powerful, who, living in these houses of stone within their walled cities, must have thought themselves invincible ; who had their palaces and their sculptures, and who, no doubt, claimed to be *the* great nation ; and that this people should have so passed away that for many centuries the country they inhabited has been reckoned a desert, until some traveller from a distant land, curious to explore these regions, finds these old towns standing alone and telling of a race long gone by, of a people whose history is unknown, whose very name is a matter of dispute ! Yet this very state of things was predicted more than two thousand years ago. Through Jeremiah, God made it known what doom the people of this country, for their wickedness, would have to await. Con-

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\* As I have frequently been asked how these stone doors were hung, it may be useful to enter into some further detail about the construction of the houses. Every house is built of huge square blocks of basalt, which sometimes are of an enormous length and thickness. All the rooms are rectangular, and the door, which is usually of one solid piece of stone, six feet in height and a foot in thickness, is made in such a manner that above and below, at one end, a projecting piece is left, which is rounded, and thus forms a cylinder of the same diameter as the thickness of the door. These projections are received in two hollows in the stones, one lying on the ground, the other above uniting the door-posts. In this manner the door moves easily, and is placed in so firm a position that it would be almost impossible to wrench it off. In the upper rooms there are small apertures, closed in like manner by a similar but smaller slab of stone—these were the windows : while on the inside of each of these doors and windows a deep groove is always seen, sometimes large enough to admit a man's arm, in which the bolt used to run—perhaps this was likewise of stone. It may seem an argument against the high antiquity of these houses that the blocks of stone should be found so well chiselled, and the doors so highly finished ; and it would indeed cause serious doubts, because we should hardly have dared to assume that iron instruments were in use in the time of the Rephaim, had we not happily a notice in Deuteronomy that Og's bedstead or tomb was of iron, and of such proportions that iron must have been very plentiful among them for it to have been used in such immense quantities.

cerning this very country the prophet spoke when he wrote these words: "For the cities thereof shall be desolate, without any to dwell therein;"\* and the people "shall be destroyed from being a people, because he hath magnified himself against the Lord."† In many instances it is not clear how the prophecy has been carried out; in many cases disputes may arise about the actual fulfilment of a prophecy, but here; I think, there can be no ambiguity. Visit these ancient cities and turn to that ancient book. No farther comment is necessary.

To return to my account of the city. On one of the houses I found the single word ΟΔΑΙΝΑΘΟΟ. I hoped that this might lead to the discovery of some Palmyrene inscription, but I could find nothing more. We know how common this name was at Palmyra; probably some merchant of that city had settled at Um el Jemál, and inscribed his name on his house.

In Suweideh we find a remarkable tomb, evidently of Palmyrene construction, on which Mr. Porter, in 1853, found a Greek inscription to the effect that Odnathos, son of Annelos, had built that monument to Chamrat his wife. The coincidence between the name and the architecture of the tomb struck Mr. Porter, and on a careful examination of this building the other day, I found an inscription deeply cut in the Palmyrene character.‡ The inscriptions are, however, not quite of identical import.

In Um el Jemál there is a fine arch, like the triumphal arches in Roman cities, and under it lies a mutilated inscription in Latin, almost the only one in that language I saw in the Haurán. No doubt this city, from its size and the richness of the soil about it, must have been a most important place under the Roman rule, as in times long before. There are numerous reservoirs here, but, like those in all the other towns about there, they are quite dry. The tombs are outside the walls of the city, so that here, as at Palmyra, they practised extramural burial. After leaving Um el Jemál "el Kibér," as this city is called, I came to Um el Jemál "ez Zughér," or "the little Um el Jemál," and then visited the towns "Subbah," "Subhiyeh," "Um es Senéneh," "Um el Kotein," "Kureim," and others, and then returned to Bozrah. We had passed the nights in the encampments of Arabs of the tribe "Serdíyeh." On reaching Bozrah I paid my Arabs the promised 400 piastres, when I was told that I had promised 1007. "No," said I, "you asked 500 ghazíyeh, and I promised 400 piastres." However, it was of no avail; they brought all the elders of the three tribes to swear that I had promised them the sum they stated; and, in spite of all the bread and salt and even mutton we had eaten together, they said they would never let me

\* Jer. xlviii. 9.

† Jer. xlviii. 42.

‡ Buckingham had copied it before me. See 'Travels in Syria.'

go until I had paid them what they asked. The only thing, I knew, with these people, was to be firm. I told them they might keep me as long as they pleased, or take from me all I had ; but I never would *give* them anything beyond the 400 piastres I had promised. I might have stayed perhaps some days their prisoner, but my friend "Ismail el 'Atrash" of 'Ari, being anxious at my not returning, came down with a large force of his people, rode into the town, and took me off with him. The Arabs, in spite of their bitter hatred of the Drúzes, and although they were far more numerous than my 'Ari friends, dared not attack us, knowing full well that, if they did, the whole nation of the Drúzes would soon be upon them. It may seem that 400 piastres, or about 3*l.* 8*s.* of our money, is a small sum for such a journey, and attended as it was with some risk, for had we fallen in with any of the 'Anazeh we should have been attacked. But although this sounds a small sum to European ears, it is a great deal for a people who have no wants and rarely the means of spending any money. It would have been easier for me individually, no doubt, to have given a larger sum, and it would have been worth the money to save time, but I always felt it my duty in opening a new track, as it were, to consider future travellers. Amongst these tribes no European had ever yet been, and so whatever price I gave would form a precedent for all future travellers. They never again would take less. I regret to say that almost everywhere travellers, and especially English travellers, have been too thoughtless on this head, so that some parts are almost shut up to the traveller, owing to the extortionate demands of the Arab sheikhs. No one, however, has done so much mischief in this way as M. De Sauley, who has literally closed the road for some time to travellers east of the Dead Sea. If you wish no one to follow in your footsteps, you cannot attain your purpose more effectually than by giving a great sum to the Arabs who accompany you. They are sure to double the demand on the next traveller.

Amidst murmurs and curses we rode out of Bozrah, and glad I was to get out of the town, because when once in the open field a well armed man can always make a good fight, but within the narrow streets of a town you are exposed to very unequal chances. In two hours we reached "Kureiyeh," the ancient Kerioth, and thence started on our journey amongst the ruined towns east of "Salkhad." We went out a party of fourteen—the chief, Kubelán, surnamed "el 'Atrash," and brother to my friend Ismail of 'Ari, his son, ten of his people, my servant, and myself. We were all tremendously armed ; in fact each man was a moving arsenal, and his people were chosen from among the most determined of the Drúzes. The 'Anazeh were supposed to be fairly off,

but we were likely to meet with some stragglers, who if they were numerous would be sure to give us battle. During the summer "Feisál," the redoubted chief of the Rúala 'Anazeh, had been on good terms with Ismaíl, but simply because that chief of the Drúzes was powerful enough to protect the lands of his people, and Feisál finding he could no longer plunder with impunity made a truce; but this was well known to last only during the time the 'Anazeh were encamped near the Haurán. When once on the move they had the advantage, and would take any opportunity of avenging themselves on the Drúzes. We had likewise other enemies, the Serhán Arabs, from whom I had just escaped. Had I been in that part of the country three weeks sooner, I could have arranged with Feisál to take me all through that country south of Salcah for some days' journey, and then I could have seen all the cities. Now we could only go out a certain distance, because the Drúzes had no dromedaries, and horses could not go very far for want of water. From Kureiyeh we went south and came to "Um er-Rumán," "the mother of Pomegranates." This was a very curious old town. I had heard a good deal about it from the Arabs, but in this case I found the account they had given about its beauty correct. The houses were in a very ruinous state, but the tombs were more than usually handsome, and decorated with carvings of fruit. Yet they were certainly not Roman, but resembled some of the more beautiful tombs outside Palmyra. Leaving "Um er-Rumán" we came successively to a number of these old towns. I do not give an account of each of them here because it would become tedious. I have all their names written down and have copied all inscriptions in them I could find. Amongst the most interesting were "Mashkúk" and "'Anz."

It was evening, and the sun was setting behind us when I saw in the plain to the north a very large number of horses. I was riding with one of the Drúzes some distance behind the party, and remarked to him that he had better be on the look-out, for we must be near some encampment. "Yes," said he, "and they are not only horses but horsemen we see." We then rode up to our party, and we immediately got into order to repel a charge. It was some time before they got near us, although they were coming at full gallop, but as they approached we could see their number was great. They now began to yell, and give their long spears that peculiar quiver which every one who has been among the Arabs will well recollect. We cocked our picces and presented, they were coming at full speed towards us as if making a charge, when suddenly they seemed not to like the look of us, wheeled round and rode off.

We were not sorry for this, as may be imagined, but we were not at ease even now. We were quite out in the Desert, away

from any support, and we did not know by how large a body we might be attacked in the night. However, we made the best of our way for some time eastwards until we came to a city in which we could intrench ourselves. After placing our horses in safety, we secured ourselves in one of the old houses, and then felt quite safe against any attack.

Before sunrise we were off again, and soon came to the old road leading from Salcah to Busrah on the Tigris. This road I should like to follow straight across the Desert. It might be feasible, but one would be exposed to such frequent attacks of different tribes of Arabs, that it is very doubtful whether the journey would ever be safely accomplished. Under some hills called "Tellúl el Hosn" the road ran, and here I found a town with reservoirs and large buildings, which was probably a station on this road. It were much to be desired that some one should undertake a journey along this road. There must be many stations on it, and most likely some interesting inscriptions would be found giving us some insight into the history of this country. Leaving the road again I went northwards until I reached 'Ormán. This was a place of great importance, and from some inscriptions on a public building which were copied by Burckhardt, who had been the only previous visitor to this place, it is identified with "Philippopolis."\*

From 'Ormán an old road leads to Malah, a larger and more interesting town even than 'Ormán. It was very perfect, and had five of those curious towers I have so often mentioned. I had hoped to have found its ancient name, as it must have been even more important than Philippopolis. There were some Greek inscriptions reversed in one of the buildings, but almost illegible.

The road from 'Ormán goes on to "Deir en Nasráni." This was the extent of my journey eastwards. The road turned northwards, and I was told led to "en-Nemáreh," and as this agreed with what I heard before, I had little doubt that this was the great road connecting Bozrah and Palmyra.

This is an interesting fact. We might well expect that in the flourishing days of two such great cities as Bozrah and Palmyra were, a direct road would have existed between them, but it is nevertheless satisfactory to find what in all probability is that old road. It must have been constructed at considerable expense in that portion which passes through the Hárrah, as for many miles every stone had to be removed, and considering the distance traversed and the great breadth of the road, this must have been a work of great labour.

After having spent five days in the Desert in this journey from

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\* See Burckhardt's 'Travels.'



Kureiyeh I returned to Ayún and thence to Salkhad, so that I had seen nearly the whole of the eastern border of the "Jebel ed-Drúz." Salkhad, the ancient "Salcah" of Og's kingdom, I shall not describe, but refer the reader to Burckhardt and Porter. From the castle I now enjoyed the splendid view over the Desert, which those travellers have recorded with such delight; but I had the additional satisfaction of having now seen almost every one of the many towns which are dotted about the plain, and although I eagerly desired to have gone farther and explored more, I turned my back on Salcah—with the satisfaction of having succeeded far more than I could ever have expected, in my original design—and I hope, with thankfulness for having been preserved from the many dangers to which one was necessarily exposed in such a journey. I had, indeed, every reason to rejoice. Burckhardt, who would have given much to go out among these cities, had been prevented from accomplishing his purpose; and it was only because I was peculiarly favoured by circumstances that I had the good fortune to accomplish a journey which far more enterprising travellers than myself had been forced to give up.

Before turning away from Salcah I should like to make a few general remarks on a country once so thickly peopled, and now marked as a desert in our maps, and which is to all intent as real a desert as any portion of that large plain lying between Damascus and the Euphrates.

That the towns situated in this country, like all those of Bashan, are of the very highest antiquity there can be no doubt. All this land in the earliest times was inhabited by a wild and powerful race called the Rephaim, who are mentioned as being in this country in Abraham's time, and who had at the earliest periods built their cities of stone and walled them round. While the children of Israel were yet in the wilderness south of the Dead Sea, the spies who were sent to examine the land brought back such fearful accounts of these Rephaim, who dwelled in cities "walled up to heaven," that the Israelites mutinied against Moses for bringing them to fight these people. They appear to have been of enormous stature, so that their very name was the word which came to be used to denote a giant.

In our translation of the Old Testament, indeed, the name Rephaim has frequently been rendered by "giants," when it was intended rather to refer to the people as a "race," and so a confusion has arisen. (See for instance Deut. iii.)

Og, we are told, was of the remnant of the Rephaim, and that he was indeed a giant the length of his bedstead shows. We are told "his cities were cities of stone, with high walls, bars, and gates;" these are the cities which the Israelites took from him; these are the cities which in later times the Romans occupied and

adorned, and these are the very cities which still are standing and bearing testimony to the truth of God's word.

Suppose for a moment that no one had ever yet travelled in the Haurán, on reading the different passages in the Old Testament which refer to that country, should we not, when we read the account of such prodigious numbers of stone cities, have expected to find at least some remnant of them now? And when we read in Deuteronomy iii. of "three-score walled towns, and unwall'd towns a great number," and we see how small a space Og's kingdom occupies on the map, we almost might feel tempted, as many have been, to think that some mistake with regard to the numbers of these places had crept into the text. But when we go to the very country, and find one after another great stone cities, walled and unwall'd, with stone gates, and so crowded together that it becomes a matter of wonder how all the people could have lived in so small a tract of country; when we see houses built of such huge and massive stones that no force that could ever have been brought against them in that country would have been sufficient to batter them down; when we find rooms in these houses so large and so lofty that many of them would be considered fine rooms in a large house in Europe; and lastly, when we find some of these towns bearing the very name that cities in that country bore before the Israelites came out of Egypt, I think we cannot help feeling the strongest conviction that we have before us the cities of the giant Rephaim, the cities of the Land of Moab. These cities have become gradually deserted, as the Arabs of the Desert have increased in number, and now south and east of Salkhad not one of these many towns is inhabited.

It is worthy of notice how many crosses are seen on the houses in these towns. Everywhere in the Haurán crosses are met with, but nowhere in such numbers as in the towns I have just described. These were the cities of Aretas, king of Arabia; here St. Paul first preached, and perhaps even then the first converts might have made themselves known by marking a rude cross on their houses. The larger houses are not especially marked so as to lead to the supposition that these had been houses of assembly for prayer—the crosses were too frequent also for that—no, I rather think, as I have said, that they were intended as a special mark to distinguish the abodes of the Christians from those of the infidels. To one more point I must refer before I leave this subject. I frequently mentioned having found large tanks or reservoirs for water. When I was reading my first paper it was proposed that some gradual upheaval of the soil, from some igneous action, might have caused the present absence of water in these towns. I think that from our finding such large tanks we may argue that then, as now, the inhabitants depended solely upon rain-water, and I cannot help

thinking that, on a supposition which is not a forced one, of there having been many trees near these old towns in former days, we could account for there having been far more abundance of rain than there now is since these trees have vanished.\*

I mentioned this suggestion to several geologists, and in support of this view I cited the fact of the amount of rain having greatly increased at Cairo since Mohammed 'Ali planted so many trees about the city. It was, however, doubted whether in a desert, so far away from the sea, the same phenomena would appear. I should be glad if this point were well investigated, as it is an important one in connection with the former history of this country.

With regard to the remainder of my journey I shall say but little, having already drawn out the former part of it so much, and it was that portion of it which strictly came under the head of explorations. Leaving Salkhad, we rode in a short time to Kureiyeh, whence in the following day I again made an excursion to the mountains east of this town, and came to the remains of a temple at "'Ain Abu Hamáka," and then visited "Keristh" and "Kaweiris," and so completed my survey of the eastern border of the Jebel ed-Drúz.

I then made for "Suweideh," the traditional birthplace of Bil-dad, the friend of Job. This great city (it is, I think, the largest in the Haurán) is filled with Roman remains; but no inscription has yet revealed to us its name under the Roman government. It is outside this city that the Palmyrene monument is found of which I spoke. From Suweideh to "Kunawát," the ancient "Kenath," is a beautiful ride, the path leading the whole way through the forests of oak.

Kunawát itself occupies the most beautiful position in all Bashan. Many splendid buildings are found here, and in a hippodrome are some remarkable sculptures, statues of horsemen, and a gigantic head, a sketch of which was exhibited at the meeting of the Society, but which was not supposed to be of higher antiquity than the Roman period. At Kunawát I was visited by the great Imám of the Drúzes, probably the most learned man in this country. He was a young man, not quite forty years of age. I had already got the names of places written down several times before, and I asked him to do me the favour of writing down all the names of these places again. I thus have four lists, and in very few cases is there any discrepancy in the spelling, so that we may feel confident of having, at least, the accurate names of the places I saw. We had a very long conversation together, many of the Drúzes sitting

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\* After reading this paper in March, Sir Roderick Murchison quite supported my view, and cited several instances in Russia of a great decrease of rain having taken place since the removal of forests.

around us in very respectful attitudes, for they look upon their Imám as a very exalted personage.

He would talk but little of his religion, but told me a good deal about "history." He told me that in olden times Abraham had lived, and that he spoke Hebrew, then came Izaac who spoke Syriae, then in our Lord's time Greck was the language of the country, and now all speak Arabic. These he said were the only four languages that had ever really existed. I asked him what he made of English. "O," said he, "that's no language, that is Turkish." I thought it was useless to say more. He told me that Job had been a native of his city, and he took me to Job's house. I asked him who Job was. "O," said he, "Nabi 'Ayúb (the prophet Job) was a great sheikh, who had, oh! such numbers of oxen and sheep, oh! kitár, a very great number, and he ruled this country." He seemed to know nothing of Job's misfortunes; nor did he know the names of Job's friends or anything about them. This is an interesting tradition that these people have preserved, of this country being the land of Job; and it is the more valuable finding it in this way, because if it had been the remains of any invention of the early monks, you would expect that the history of Job's misfortunes would be the circumstance most carefully remembered. I learned a great deal that was really interesting from this Drúz, who came to see me every day I was there. He begged earnestly for books, and showed a real desire to have the people instructed. For an account of this remarkable place I must again refer the reader to Porter's 'Five Years in Damascus.' I heard of some ancient towns—whose names I have—east of Kunawát in the forests, but I did not go to them, as I was now rather impatient to reach the Léjah. From Kunawát I went through "Suleim," then near "Kefr el Laha," and so to "Nejrán," an old town on the south of the "Léjah." I stayed the night there, and a great feast was prepared at which the chief was present, a fine old man, but he was now very weak from age. He talked with much regret of what had befallen Mr. Porter at "Edhr'a;" it was just after he had left the protection of this sheikh that Mr. Porter was attacked and nearly killed. Here I enquired about the practicability of entering the Léjah. It was arranged that we might do it. We took a strong guard, not only on account of the dangers of the Léjali, but because I was determined to come in force to Edhr'a, lest I should experience the same reception that Mr. Porter did. In the morning we started, and followed for some distance an old road; this we presently left, and then the way became very bad. In some places the horses could hardly keep their footing; in others we had to jump and scramble across large fissures in the basalt, so that by the time we reached "Dáma" men and beasts had had enough of it. I saw on the way

"'Ahiri," "'Tell es-Sumeid," and other towns. Dáma, which is in the very heart of the Léjah, had been reached, though from the opposite direction, by Burckhardt, while all that part of the Léjah, with the exception of Dáma, which I now saw, was explored for the first time. At Dáma I found some of the grandest specimens of the old houses and stone doors of Bashan which I had seen anywhere. After Dáma I went through a succession of old places of considerable size and well preserved. I give the names of the most important—"Harran," "Lubbein," and "Jerein"—and at last came out on the western side at "Busr el Haríri," a village inhabited not by Drúzes but by fanatical Muslims. They treated us here with little respect; we only gave water to our horses and then rode on to the broad plain which reaches to the Sea of Galilee westwards, and in a short time the black city of Edhr'a was before us. Although we were a strong party, yet it was with some anxiety that I looked forward to our reception at Edhr'a. I was the first European who had been in the place since the attack on Mr. Porter by its fanatical inhabitants; however, we entered the town, and were only assailed by scowls and curses. The next morning I walked all over the city, and copied all the inscriptions I could find. This exasperated the natives, but we were so well armed that they did not like to interfere with us. When I had seen all, I got on my horse and we left this inhospitable place with little regret.

Edhr'a was, I have little doubt, the Edrei of Og, where his last battle was fought, in which he fell, and which determined the fate of Bashan. El Léjah is the ancient region of "Argob" mentioned in Deuteronomy, and called "Trachonitis" in a later time; and all the cities around and within this rocky region were the cities of Og. Of its physical geography I have already spoken, and the description which I gave of the Safáh will apply equally to the Léjah. They are two of the most remarkable instances of a volcanic formation perhaps in existence.

I now had to part with my good friends the Drúzes. I was going straight across the "Jaulán," the old "Gaulonitis," to the Sea of Tiberias, and as I had to pass through two towns, with the inhabitants of which they had blood-feuds, I could not take them with me. They rode out about an hour and a half from Edhr'a, and then took their leave of me. And now came the most unpleasant part of my whole journey. I had to ride across this country quite alone, with my two servants and the muleteers, and these last I knew would run away at the first attack: and not only was the whole country overrun by Arabs, but the towns were inhabited by the most fanatical Mohammedans, who had rarely, and many of them never, been in contact with Christians. On reaching "Nawa," I went directly to the house of the sheikh, and,

although he was far from civil, yet I was not molested. The next day he went with me round the town. On the following day I was attacked on my way to "Fík" by some Arab Feheliyeh, but I succeeded in protecting my property, and in spite of many interruptions actually reached Fík without losing a single article. Here I put up at the sheikh's house, and spent some days there, which I employed in exploring the high land above the Sea of Tiberias, all the wádis or glens which go down to the lake, and the whole eastern shore of the lake. In one of these glens our Lord performed the miracle of feeding the five thousand. I found numbers of ancient towns on the highland of Golan. I was told there were 300 ruined places in Jaulán and Jedúr together. I took down the names of nearly 150, and saw above 30. One was called "Sahm el Jaulán;" this may be the old "Golan," the northernmost of the three cities of refuge on the east of Jordan. From Fík, running down to the lake, there is a great wádi, called "el-Jamu-íyeh," or the Buffalo-road, and on a hill rising from the shore of the lake are the remains of a town and a castle called el-Hosn, and which, from its position, there is little doubt, is really the "Gamala" of Josephus. This deeply interesting country all about the Sea of Galilee deserves a paper to itself, and willingly would I give a more extended account of my researches here, the more so because the eastern border of the lake has rarely been travelled, and the wádis, as far as I know, never before carefully explored. I cannot, however, trespass any farther beyond the space allotted to me, but still hope at some other time to be able to contribute something more to the knowledge of the geography of these counties. I am on the eve of starting again for the East, and in the journey I have now before me I hope once more to go to my old cities, and, if all be well, to endeavour to penetrate farther into that portion of the Desert along which the old road to Bozrah leads. I likewise hope to see Mesopotamia, and especially that central portion in which many old cities are said to be standing, and to spend some time at Nineveh, and so to Baghdad and Babylon.

To conclude the account of my journey. After making an unsuccessful attempt to reach "Gadara," owing to the hostility of the "Beni Sakhar," I crossed the Jordan near "Sammakh," and passing by "Kerak," the old "Tarichæa," soon found myself in safety at Tiberias. Here my dangers ended, and thankful I was to get a rest. It was now very late in the year (the end of November), and the early rains had begun, and so I did not spend much time on my journey from Tiberias to Jerusalem. I had already been over most of Palestine, but still very much remained to be done, and I am sure that half a year employed in

the careful inspection of the country west of Jordan would lead to the most valuable and fruitful results.

I am now more than ever convinced that among the evidences of the truth of Scripture, there are few stronger than those—undesigned—coincidences which arise out of the examination of the topography. Before the present century little was known of these countries; but now each few years some researches bring to light more and more facts connected with the early history of the places with which we are so much concerned in Holy Writ. And we may be quite sure that every certain extension of our knowledge in this respect will afford us additional conviction of the scrupulous accuracy of the Holy Scriptures. At the same time such knowledge is not to be attained without some difficulty and risk, but I think that one may well be justified in incurring these, where there is a hope of such important and valuable results being attained.

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#### NOTE ON THE DRÚZES.

THESE people, who are now almost the only settled inhabitants of ancient Bashan, do not appear to have made their original settlement in the Haurán. The eastern side of the chain of Lebanon seems to have been the earliest abode of this people with which we are acquainted, but how many centuries they have been settled there we do not at all know. In the twelfth century they were already numerous in that part. Of the Haurán we knew so little until the present century that it is uncertain whether a few centuries ago there were any Drúzes there or not. At all events their number has been continually increasing since 1810, when Burckhardt was there, down to 1857, when I was there; and not only from an *internal* increase of population, but from the gradual reinforcements which the Haurán Drúzes have been receiving from their brethren in Lebanon. Of what race the Drúzes are is likewise uncertain. They are a very mysterious people, and have hitherto baffled all our researches. They say themselves that they come from China, "*Belad es-Sú,*" which is worthy of attention, because, except to a few learned men in the large towns, the very name of China is unknown; and these people, although they neither read nor write, know very well in which direction China lies. It is beyond India, they say, if you ask them. From their type they are clearly not a Semitic race. They are fair-haired, and of light complexion, strong and well made, and often as tall as northern Europeans. Their countenance is much more manly and determined than that of the Semitic population; and instead of the effeminacy of the Turk, and the want of energy of the wretched Arab, you find amongst these people a real activity and desire for work which reminds one of the Saxon race. The language which they speak is the purest Arabic. They speak as correctly, and pronounce as accurately, as the most educated Muslims of Mecca; and this, I believe, is another strong evidence in favour of the Arabic having been originally to them an acquired language. I believe many philologists will bear me out in this. So, taking all together, I feel, in my own mind, convinced that this people is of an Indo-Teutonic race, which may have come over at some distant period from the other side of the Desert, but whose original country was Northern India, or possibly China.

Their religion is very secret; all we know of it is derived from two books, which were taken from them by the Turks in war, and were sent to Paris, where they were deciphered and published by the celebrated orientalist De Sacy.

It appears that they believe in one God, but without attributes. His first creature was the "*Universal Intelligence.*" Both God and this Universal Intelligence have been incarnate at different times, but the last time was in the eleventh cen-

tury, when he became a man in the form of the Khalifeh of Egypt, and the Universal Intelligence in the form of his great vizir. After reigning for some time he suddenly vanished, and rose to heaven, and the Universal Intelligence still remained on earth, and visited the faithful Drúzes, to whom he revealed many important facts in connection with the future.

His next appearance will be at the end of all things, and the good Drúzes will be established again in the land of their ancestors—Chiuá.

However, even now, they have a conviction that the good Drúzes, at their death, go to China, while the souls of the wicked occupy the bodies of camels, or even of dogs.

They frequently asked me about China, which is indeed their Celestial empire. This religion, which will be seen to resemble in many respects the Buddhist religion, is again in favour of the far East having been the origin of these people. That they were visited by the vizir, who preached about his mad master, “el Hakem Bi Amr Allah,” is matter of history. This khalifeh imagined himself the Almighty, and commanded all the Egyptians to worship him on pain of death. He was a cruel tyrant, who persecuted all people. His end was mysterious; he was probably murdered; but the vizir took advantage of this to spread the report that he had ascended to heaven. When, however, it appeared that the khalifeh was dead, the people no longer made a secret of their own religion, and the vizir, finding his position dangerous in Egypt, escaped to Lebanon, where he found these Drúzes, whose religion already prepared them to receive without doubt the words of this man. The Drúzes have twelve chief priests, who are the initiated, and called “Akkál.” They do not drink coffee or smoke; and to them the secrets of the religion are entrusted. When one dies, his place is filled up from among the most discreet and learned of the race. The great priest, or Imám, lives at Kumawát. He told me they had many very ancient books, but what they contained of course he would not say. Perhaps some day we may get possession of these manuscripts, and then we may hope for some real knowledge about this remarkable people.\* Their present number is, I believe, as follows:—

In the Lebanon .. .. .	60,000 men
About Hermon .. .. .	4,000 „
About el Merj Ihn'Amer and the 'Akka country ..	4,000 „
In the Haurán .. .. .	7,000 „

which gives a total of 75,000 men, without women and children.†

The Drúz women are more carefully secluded than even the Muslem women. They are rarely seen, except they be veiled. The married women wear a remarkable head-dress, very much like a sugar-loaf, made of wood, or, amongst the richer class, of silver: it is two feet in length sometimes, and from it falls a white veil, which completely hides the face. This head-dress is called “tantúr,” and is supposed by some to be the “horn” sometimes referred to in Scripture.‡

On the whole, there is no people in the East who give so much hope for the future as these Drúzes. If euergetic measures were taken at once, and a well-organised mission established among them, I believe there would be really a great hope of making them Christians. With the Muslems you have not only prejudice to contend with, but what is as bad, effeminaey and inactivity. The sensual and degraded follower of Mohammed will, only after a long struggle, be rescued from his long-contracted and, one may say, hereditary habits of self-indulgence; and until the ruler of the empire be himself a Christian, such a result can never be hoped for, and will never be attained.

\* The seven standard theological works of the Drúzes are now in the possession of Mr. Porter, who succeeded in purchasing them a few months before he left Damascus.—ED.

† Mr. Porter places the total Drúz population at about 78,000 souls.—ED.

‡ See Psalm lxxv. 4, 5.



VII.—*Contributions to the Knowledge of New Guinea.* By  
Dr. SALOMON MÜLLER.

Translated from the Dutch by JOHN YEATS, ESQ., F.R.G.S.

Read, March 22, 1858.

THERE are few islands of any extent or importance between the tropics and the temperate zones that have been so seldom visited and scientifically examined by Europeans as Papua or New Guinea. This is the more remarkable when we remember that the place was early discovered, and is, moreover, situated close to the Moluccas, which, on account of their valuable products, have attracted the attention of every maritime power.

Our knowledge of the south and south-west coasts in particular is very limited; any approach to the former of these being dangerous in the highest degree from the numerous coral reefs and sandbanks that obstruct the northern shores of Australia.

In 1826 the Dutch brig *Dourga*, under command of Lieutenant Kolff, was sent thither to investigate part of the coast, and also to make inquiry into the condition of the inhabitants. Steering from Amboyna to the south-westerly promontory of New Guinea, Heer Kolff discovered, about 24 geographical miles north of False Cape, a wide opening which appeared to be the mouth of a river, and to which he gave the name of his vessel; he afterwards kept a north-west course until he came to the small island of Lokahia, 134° 50' E. of Greenwich. From Lokahia he departed to the Tember Islands, after having lost one of his crew in an affray with the natives.

In the beginning of 1828 two new war-ships were sent out to the south-west coast of New Guinea by the Dutch administration of India, namely, the corvette *Triton*, and the colonial schooner *Iris*. Five scientific men accompanied the expedition, and from their reports collectively, the sole survivor, Dr. S. Müller, has drawn up his narrative.

“Despatched to examine the coast and select a place suitable for a settlement, we came at the end of the month of May before the broad opening of the so-named Dourga River. After proceeding up it for some days in an easterly direction, the uncertainty of this course, together with a threatened scarcity of fresh water, induced us to prefer the sea again and view the shore more northwards. We found some opportunities for intercourse with the inhabitants, and also for examination of the country. The discovery of a deep and spacious bay, lat. 3° 45' s., and long. 134° 15' E., with lofty picturesque coasts, determined our choice of a site for the little fort which was built here, and named Fort Du Bus, in honour of the Dutch Commissary-General for India.

“The death of twenty of the ships’ crews, and the sickness of upwards of sixty others, made further research impracticable, but the vessels which afterwards carried provisions to the fort once or twice a year made additional discoveries. In April, 1835, Heer Langenberg Kool, commander of the war-schooner *Postillon*, sailed through the supposed river Dourga, and proved it to be a strait; it was named by him Princess Marianne Strait, and the island to the west of it Prince Frederic Henry Island.

“The physical condition of the coast on the south and south-west sides of New Guinea, investigated by the *Triton* and *Iris*, is very varied. From east longitude  $132^{\circ} 30'$ , or perhaps a little less east, to about  $135^{\circ} 30'$ , there are high cliffs. Only here and there are levels to be seen, principally within the numerous bays, while in other places the rocks rise perpendicularly from the sea, particularly about the headlands. Near the last-mentioned degree of longitude the rocks retire gradually southwards from the shore, so that in this direction an extensive level border is visible, which stretches away in one vast wilderness to Torres Straits. As far as the eye can reach there is not the slightest trace of elevation in the ground between the two most southerly degrees of latitude; but in latitude  $5\frac{1}{2}^{\circ}$  about, in clear weather, and far inland, there rises a lofty mountain-chain which opens out the farther we go north (about  $4\frac{1}{2}^{\circ}$ ) and then presents an uncommonly bold aspect. Some of the summits seem to be raised above the limits even of perpetual snow; at least we are at a loss how otherwise to account for the shining white layers that covered the highest peaks and surfaces. During the day little was to be seen of the chain, as thick clouds commonly shrouded it; but early in the morning, just before or after sunrise, it displayed itself in all its immensity along a vast extent of country. Its chief direction appeared to be nearly east and west, so that between the 135th and 136th degrees of east longitude it comes very near to the smaller chains which thence hem the coast-line northwards. These last, therefore, follow the south-easterly and north-westerly direction of the island. Very remarkable, however, is the difference that exists between these distinct mountain-ranges. The chain lying far inland exhibits in general softly-swellng outlines. Among the high projecting summits a number of broad flat crowns particularly arrest attention: extensive plateaux probably, which, judging from their situation, must be surrounded partly by a temperate, partly by a cold climate. The more northerly coast elevations, on the contrary, are almost everywhere rude and eraggy in form, not unfrequently resembling tall turrets and fractured battlements. In general the chain on this part of the coast is only of moderate elevation. That which stretches along the shore seems nowhere to exceed a thousand metres (3280·89 feet) in

height; in most places where we saw it, it does not rise above two or three hundred mètres (600 to 1000 feet). But the mountain Lamantsjieri, one of the principal crowns of the chain, is according to trigonometrical measurement 750 39 mètres high (2460·67 feet). This lies in the background of the bend Oeroe Langoeroe, or Triton Bay, in 3·39 south latitude.

“The islands along the coast we examined are in general of the same nature as the solid wall in the neighbourhood of which they are found: where it is low, they are so too; where it is high, they are equally so. We found the greatest number of islands under the high coast. On the whole they agreed with this latter both in external form and internal constitution, and were separated from it by straits or channels more or less broad. Their banks are mostly steep as unbroken walls, and, where damaged by the heavy current, are commonly much undermined, and perforated above water. Within the bays and coves that are found along the coast at intervals are small sandy patches peopled by the half-nomadic Papuans.

“In the straits alluded to, also along the remaining part of the high coast, the navigable water, as far as known to us, is pure and very deep; so much so that on board the *Triton*, while cruising in these straits, ground was seldom reached at a depth of from fifty to ninety fathoms, even when we were not more than a cable’s length from shore.

“Farther to the south, on the contrary, where the coast is low and flat, a ship of moderate dimensions cannot approach within a mile, or even two, without the greatest precaution and constant use of the lead. It is only in a few places that the bottom exhibits a marked declivity. Islands are seldom seen along that southern part, but sandbanks are observed both above and below the surface.

“Among the numerous river-mouths on the coast, some are of considerable breadth. Of course the origin of several of the streams must be sought for far inland, as in the southern portion of New Guinea the waterparting lies at a great distance from the west coast. The only river examined by us in these parts, the Oetanata, is about one-fifth of a mile broad at its outlet, while its depth varies from four and five to six and seven fathoms. Not very far up it splits into three small arms, named Toega, Wakia, and Baai. By the sea-side its banks are dry and sandy, but inland the above-named sections wind through a marshy soil, consisting of clay mixed with loam. As far as we know, the *Triton* and the *Iris* were the first ships that ever sailed into the Princess Marianne Strait from the north; their failure led to the later expedition of Heer Langenberg Kool, which was entirely successful. The strait is upwards of two geographical miles wide at its northerly

entrance, but becomes gradually narrower inland, so that about the middle it is only a quarter, and a little farther south but a sixth of a mile broad; farther in towards the opening on the south it widens again to the breadth of about half a mile. Its depth, reckoning from low-water level, is from four to upwards of ten fathoms: at the southern outlet only Heer Langenberg Kool found it diminished to scarcely two fathoms; within the strait it commonly increased from the shores towards the middle. Along the whole of the passage the banks are low and mostly marshy, though here and there slips of land appear above water drier in their nature. One uniform forest is seen everywhere, containing no very heavy timber on the coasts, but inland many thick trees. Here and there this wilderness is skirted by a slip of soft clay-land; along the whole strait the bottom is generally soft, except at the southern outlet, where the ground is hard.

“This mouth is probably the same that is marked on some maps as ‘Bartholomew’ River. The banks of the strait may be approached closely almost anywhere, and with the more safety as the depth increases and decreases regularly with but very few exceptions.

“There are mouths of small streams to be met with in abundance on both banks, some of which during the ebb tide yield good drinking water, but as the flood rises they become brackish. Those which were closely examined by Heer Langenberg Kool were found deep enough at low water to allow a laden bark to pass in and out. The schooners *Postillon* and *Sircen* filled their tanks from the most northerly of the two creeks that empty themselves at but a short distance apart, not far to the south-west of the only little island that there is in the strait. Anchorage for this purpose may be found close under the wall. This finding of soft water is under all circumstances important to navigation; it would have relieved the corvette *Triton* from great embarrassment, and might have contributed much towards the attainment of the objects of the expedition. From this point of view especially, and also for facilities in refitting, the discovery of this strait is valuable; though its situation, the strong currents running through it, the narrowness of the passage, and the inhospitality of the whole region, will never allow it to be of general or wide-spread utility.

“The ground in the flat district comprising the south-western promontory of New Guinea, as far as the coast-chain which may be said to end at  $135^{\circ} 30'$  E. of the meridian of Greenwich, consists of a bluish-gray clay, that is mixed, according to the observations of M. Macklot, in some places with pieces of quartz, in others with limestone. Where the land is not laid under water by the tide, this clay is firm and covered with a thin crust of loam; but where it is daily washed by the sea-water, it is soft and muddy. There also occur in the first-named drier part which stretches

eastward from  $135^{\circ} 30'$  to  $138^{\circ} 30'$ , in many places along the coast, strips of white sand mixed with much quartz. The mountains that form the more northern shore are characterised, as we have already stated, by their rude outlines, in which angular sharp-edged crags with steep declivities alternate with deep and narrow clefts and caverns, or naked walls of rock; while the rest, where the situation is not unfavourable to accumulations of matter, are covered with a layer more or less thick of vegetable earth. According to Professor von Leonhard of Heidelberg, who has inspected some of the specimens from our collections of stones, the mountains consist of a Jurassic limestone formation (oolitic series of English geologists), and their higher parts of a very characteristic dolomite of the same age. This last exhibits in many places naked walls of a glistening white colour. In the subjacent brownish-gray dull-looking limestone, fossil shells are frequently enclosed; and in one place M. Macklot found a fossil vertebra, probably belonging to a great saurian. Farther inland there must be mountains which contain extensive layers of clay, because not only the beds of the rivers, but also the bottom of the sea in the neighbourhood of the mouths of the rivers, consist of clay. Hard pieces of this substance, from the river Timbona, which flows through the valley between the mountains Lamantsjieri and Oriori, have great resemblance, in the opinion of Professor von Leonhard, to certain strata of the tertiary formation called Tegel, which occurs at Vienna. The small bands which are met with here and there in the clefts, and within the curves and bays along the sea-coast, consist either of quartz or limestone, or of a sand of powdered white and red coral.

“To add to this geological sketch of the south-west coast of New Guinea, all that is known to us of the mineral kingdom, we remark that we found amongst the natives on the river Oetanata, large cylindrical pieces of light gray sandstone: fragments which, according to the report of the natives, had been brought from the interior. They use them as well for grindstones as for ballast in their canoes.

“Further, we obtained by barter a few clubs having their upper extremities furnished with an artistically-wrought stone, consisting of a ringing, hard, and very fine granular hornstone of a greenish-blue colour. These stones were partly of the common hatchet shape, like many of those found in the South-Sea Islands; others were of an angular star-shaped figure. In the Princess Marianne Strait were found at intervals along the banks volcanic matter of a light and porous nature. It had probably been transported from a distance and deposited by the stream. We saw sand washed up in a few places only, but where the banks of the strait are elevated beyond the ordinary level of the tide, and therefore have a

less marshy nature, we obtained pieces of the German *Rasen-Eisenstein* or *Sumpferz* (clay iron-stone), together with the iron-ore *Bolnerz*, or bog-iron.

“With regard to the growth of plants on the west coast of New Guinea, it may be said first, that in general, as far as we have seen the country, it is everywhere a wilderness, and overrun with wood. The flat parts particularly exhibit an unbroken green carpet, which does not appear to have a single unfruitful or bare place in it. Alternations of this last-named character are perceived first on the high mountainous coast, along the declivities of which groups of lofty trees luxuriate by steep precipices, and where the rude crag with its naked sides obtrudes amongst shrubs and bushes and creeping plants. To give an idea of the prevailing characteristics of the vegetable kingdom, according to the reports of my colleague Zippelius, and the kind assistance rendered by Professor Blume,—the woods along the coasts of the Princess Marianne Strait consist chiefly of *Rhizophora*, *Bruguiera*, *Avicennia*, *Petalonia*, *Sonneratia*, *Heritiera*, *Ægiceras*, *Meme-cylea*, and similar ones. In places where the ground is a little higher and less marshy, figs show themselves, *Mimosa*, and representatives of the classes *Fagraea*, *Clerodendrum*, *Carissa*, *Aralia*, *Melanthesa*, and other *Euphorbiaceæ*; while in a few more open spots along the sides partly covered with *Saccharum Koenigii*, the fan palm may be seen, and a number of the low, crooked stems of *Paritium Tiliaceum*. From the tough bark-fibres of these last, the natives, like the islanders of the great Pacific Ocean, and of the Indian Archipelago, prepare thin cords and all sorts of bands, which, plaited or worked into nets, serve for ornaments and other purposes. In the neighbourhood of the river Oetanata are to be observed along the white sandy shore, whole woods of the club-tree (*Casuarina equisetifolia*), besides fig-trees, and not a few species from the genera *Ægiceras*, *Xylocarpus*, *Salacia*, *Olax*, *Canthium*, *Scyphiphora*, &c.

“Let us now glance at the animal kingdom of the country we are considering. Very remarkable is the want of mammalia in New Guinea. Not more than six species of this class were noticed by us, which all belonged to the family of the *Marsupialia*. Three of these were unknown, and consisted of a little carnivorous pouched animal of the race *Phascogale*, and two kangaroos, which differ very characteristically from all others of the class hitherto described, in that they live upon trees. For this reason, as well as for other physical distinctions, we have formed them into a new group, under the name *Dendrolagus*. The other sorts obtained by us were the species already mentioned by Valentyn, *Pelandok* (*Dorcopsis Brunii*), a young specimen of *Petaurus sciureus*, and a few of the *Phalangista maculata*.

“Less poor is New Guinea in birds: indeed in this point it may vie with the most favourably situated of the Indian islands. At the end of the voyage, and of a three months’ stay on the coast, our collection was composed of 119 varieties, belonging to 60 different kinds. The great groups of the Passerini, Scansores, and Gallinaei, were most numerous represented by the so-termed insect-eaters, the parrots, and the pigeons. Next to these came a few species out of the families Conirostres, Tenuirostres, Syndactyli, Amphiboli, and Hiantes. Of the water-birds we had the Natatores and the Grallatores chiefly. As to those met with in the Princess Marianne Strait, only the Columba Mülleri and the Humeralis deserve especial mention.

“A very large duck, quite strange to me, was shot with ball, and rather roughly used, so that it was thrown aside as unserviceable, under the firm expectation that we should soon secure another specimen. To my great regret, however, we were disappointed, for we never saw the species again. In the wood along the banks of this strait, and also in the neighbourhood of the outlets of the river Oetanata, we often found great heaps made of earth and dry leaves, which, in the opinion of our Ambonian guides, were the nests of the Maleo (*Megapodii*). Some of these heaps excited our amazement, considered as the nests of gallinaeous birds, on account of their prodigious size. One of them, by my own measurement, was at the base 8 mètres (26 ft.) in circumference, and  $2\frac{1}{2}$  in height. The form was that of a cone flattened at the extremities. No trace of an opening could be perceived to this or to others that came under my notice.

“Of the Amphibia we obtained on the west coast of New Guinea 26 sorts: 15 of the Lizard family, 5 of the Serpent, 1 of the Tortoise, and the remaining 5 of the Frog tribe. Nearly all are unknown, or but newly described from our specimens.

“The fishes that we obtained at different places along the southwest coast of New Guinea were principally of the genera *Squalus*, *Pristis*, *Raja*, *Scomber*, *Sparus*, *Mugil*, *Polynemus*, *Clupea*, *Trichiurus*, *Triacanthus*, *Belone*, and others. Of the *Trichiurus haumela* there were more taken than of any other kind. In the Princess Marianne Strait, at low water, we saw the dry muddy shores strewed with *Periophthalmus Schlosseri*. Objects from two inches to nearly a foot in length crept, sprang, or displayed themselves—the body raised somewhat in front—as if in a sedate, almost sitting posture; the eyes like little horns or ears pricking up, stiffly standing out above the head, and looking round with earnestness and attention. Nothing so curious, one might say so comical, as the positions and movements, the peeping and staring, of this mud-loving fish. Observed at a distance it is commonly stealing away over the soft ground, but no sooner is it aware of

danger than it stops, pricks up its head high in the air, and, should any one approach, takes flight by jumping or hopping into the water.

"The Mollusca we pass by to give a little more attention to climate, &c. The following is the result of our observations from May to September, on the south-west coast of New Guinea. During that time the weather was in general more windy and rainy than still and dry, particularly during the last months of our stay. The air was mostly heavy and misty, and therefore disagreeably damp. The mountains were almost always covered with clouds, and but seldom distinctly visible. A few fine days, with a pure serene atmosphere, were only to be regarded as exceptional. The consequence was, that the temperature during the day was generally moderate, and by night cool, at times sensibly cold. The warmth was inconvenient and oppressive only when for a time no clouds at all had intercepted the sunbeams.

"On the river Oetanata the centigrade thermometer stood in the middle of the month of June, in the morning just before sunrise, at  $25^{\circ}$ , =  $77^{\circ}$  F., at noon at  $29^{\circ}$  and  $29^{\circ} \cdot 5$ , =  $84^{\circ}$  F., and towards evening, at sunset, at  $26^{\circ}$  to  $26^{\circ} \cdot 7$ , =  $78^{\circ} \cdot 4$  F. Of thirty observations with the same thermometer made during July and August, in the bay of Oeroe Langoeroe, the mean temperature appears to have been—in the mornings,  $27^{\circ} \cdot 4$ , =  $81^{\circ} \cdot 3$  F.; in the afternoon,  $28^{\circ}$ , =  $82^{\circ}$  F.; in the evenings after sunset,  $26^{\circ} \cdot 6$ , =  $79^{\circ} \cdot 3$  F.: the highest and lowest ranges of the thermometer were observed on the 14th August at 1 o'clock at noon, when the mercury stood at  $31^{\circ} \cdot 2$ , =  $88^{\circ} \cdot 1$  F.; and on the 3rd August, at 12 o'clock at noon, when it stood at  $25^{\circ}$ , =  $77^{\circ}$  F. During our stay in this bay frightful tempests more than once burst over the neighbourhood, discharging torrents of water, and being accompanied by heavy thunder and lightning.

"Lightning was indeed a very common phenomenon, occurring almost every evening in the northern as well as the southern districts. Earthquakes, according to the report of the natives, are seldom observed in the places inhabited near the shore, and never very severe. We experienced nothing of the kind during our cruise along the coast; once only, on the last of August, a few sailors of the corvette out in the woods thought they had perceived two slight shocks, and on the 1st of September, too, while we lay at anchor near a small island at the entrance of Triton Bay, there was an unusual shaking in the ship about four o'clock in the morning, without any one being able to account for it. The officers ascribed it to a marine convulsion.

"From our record of the winds it appears in general that along the south-west coast of New Guinea, with a waning moon, the south-east monsoon blows more southerly, even to south-west, and sometimes west; but with a moon waxing, on the contrary, it



turns more to the north, north-east, and north. When the heavy and long-continued rains that we had during the cruise are taken into account, the testimony of the natives seems to be confirmed, that along this part of the coast of New Guinea, just as in the Archipelago of the Moluccas, the south-east monsoon must be held to be the bad or rainy monsoon; the north-west, on the contrary, for the good or the dry monsoon. This state of the weather is thus the reverse of that which obtains on the great western isles of Sunda.

“The observations taken on board the *Triton* respecting the rise and fall of the tide, and the currents along the coast and from the land, furnish the following results:—In the Princess Marianne Strait a regular rising and falling of the water occurred, though once only in twenty-four hours, and making a difference generally of from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  fathoms. From a series of careful observations made in the bay Oeroe Langoeroe, we learn that at full moon and new moon it is high-water there at 8 minutes past 1 at noon, and low-water at 21 minutes past 7 in the evening. The fall is then 2 mètres.

“This is, however, not the greatest difference between the rising and falling, for when the moon is in her quarters the difference amounts to 2.24. There is ebb twice in twenty-four hours, and flood twice; some irregularity may however be noticed, for occasionally high-water lasts an hour longer than low-water, and the reverse. The current observed along the coast took the same direction as the then prevailing wind; thus north-west, with a rate of about  $\frac{3}{4}$  mile, excepting where interrupted by water flowing from the land, or by bends, banks, or islands. In the Princess Marianne Strait, where the course of the stream depends upon the curves in the banks, its speed was twice as great as in the sea, and therefore  $1\frac{1}{2}$  miles.”

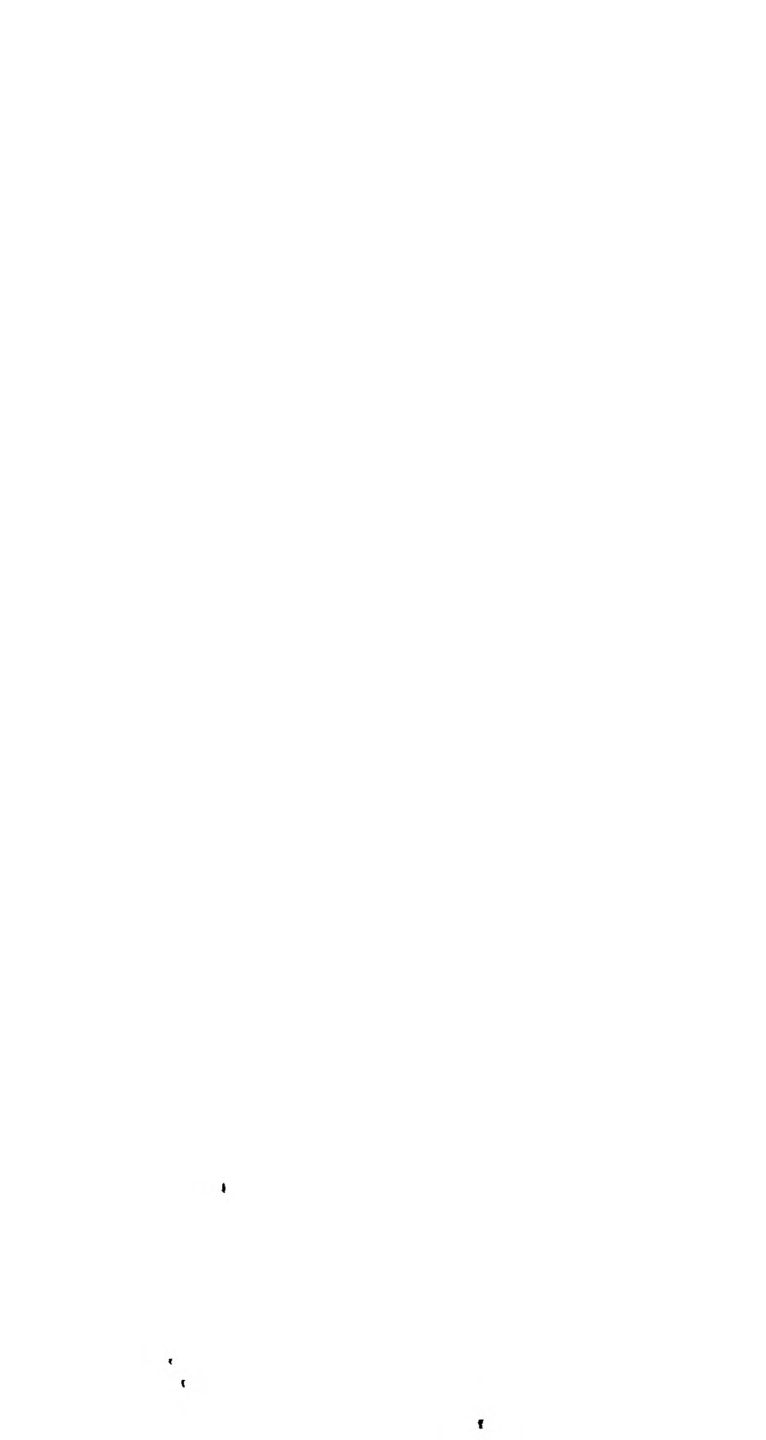
VIII.—*On the supposed Discovery, by Dr. E. K. Kane, U. S. N., of the North Coast of Greenland, and of an Open Polar Sea, &c.; as described in ‘Arctic Explorations in the years 1853, 1854, 1855.’ By Dr. HENRY RINK, M.D., Inspector in Greenland for the Danish Government.*

Condensed from the Danish by Dr. SHAW.

Read, April 12, 1858.

THE author of the work above quoted, makes the following remark in the Introduction: “This book is not a record of scientific investigations;” and adds, that his aim has been to publish a narrative of the adventures of his fellow travellers, and that he has attempted very little else. Nevertheless, on perusing this





promised "simple story" of a voyage, we find it embellished with scientific theories extending far beyond the bounds of such a narrative.\* As these speculations relate to a subject, the examination of which has occupied me during nine years, namely, the Physical Geography of Greenland, I feel called on to subject them to a somewhat closer inquiry. As his richly and elegantly illustrated work has awakened great sensation, nay even partly placed the other Polar expeditions in the shade, I am led to think that a communication of my views respecting this matter will not be entirely without interest to the Society.

It is well known that the active and undaunted American traveller, Dr. Kane, unfortunately so early carried off, attempted, in the year 1853, to go farther north up Smith Sound, than Captain Inglefield, the year previously, had done; but that he only succeeded in taking his ship a trifling distance farther than Inglefield; that he was then frozen in, lost his ship, and in the year 1855 saved himself and party by returning, in boats, to the Danish colony of Upernivik. From his two years' winter quarters in Van Rensselaer Bay, on the east side of the Sound, he, by the help of dog and drag sledges, undertook expeditions in different directions, partly across to the American side, but mainly along the coast, pursuing it northward, to find, if possible, the northern end of Greenland.

What was discovered on these tours must be regarded as the real profit of the expedition, and I will here confine myself to the two points which have cast the chief lustre over the expedition. *First*, that which concerns the unknown interior of Greenland, the glaciers and floating icebergs that issue thence, about which the author expresses himself on occasion of having discovered a glacier on the coast of Greenland, between  $79^{\circ}$  and  $80^{\circ}$  N. lat., to which he has given the name of Humboldt. *Secondly*, a sledge expedition undertaken by Morton (one of the ship's crew who it seems was steward), in conjunction with Hans, a Greenlander from Fiskernæsset; whereby they are said to have come to the margin of an *open* sea, which is presumed to occupy the whole region around the North Pole, and to be kept open by a branch of the Gulf-stream; and besides this, to have discovered the most northern lands on our globe, which, according to their description, are likewise laid down on the chart and called "Victoria and Albert," "Washington," &c., Lands.

As regards the first of these points, I must repeat what I have explained in my work on North Greenland,\* namely, how the whole of the inner mainland, regarded from the outer land, appears buried under one uniform covering of ice, which sends its branches

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\* 'De Danske Handelsdistrikter i Nordgrönland.'

down into all deep fiords; how these branches are pushed down into the sea, and yield annually large masses of ice in the form of floating icebergs or calves. The glacier discovered \*by Kane, which he has named "the great glacier of Humboldt," and which has called forth much admiration, even in well known geographical journals, has been represented as the crowning point of the discoveries made by the expedition, but which is really nothing more than what can be observed in the interior of most of the Greenland fiords, from the southernmost to the most northern reached point.

The reason why Kane has not had an opportunity to observe these, and that the one discovered by his expedition has therefore appeared to him so remarkable, lies in the simple fact, that such ice formations in general lie hid behind the numerous high islands and peninsulas, which almost form the outer coast of Greenland towards Davis Strait, and which, with regard to snow and ice, do not show any other phenomena than the higher parts of the mountain chains of Europe.

Now as the different discovery-ships, that have sailed in search of the North-west Passage and of Franklin, have always rapidly hurried through Davis Strait, and have only touched at one or other of the Danish Colonies, it is no wonder that the numerous remarkable ice-fiords, which require a longer time to travel through and examine, have more or less escaped attention. Kane had thus either not seen these ice formations, or only had an occasion of seeing them from a great distance, before he came to the place where he was frozen in and had to pass two winters. Humboldt glacier does not even seem to belong to the most remarkable among them, as even in the very southernmost of our Greenland districts, at Julianehaab, we have opportunities of observing just as remarkable phenomena of this kind.

With respect to the *second* point—namely, the *Open Polar Sea*, discovered by Morton the steward, and the Greenlanders Hans—the manner in which Morton's journey is described by Petersen,\* the Dane, who accompanied the expedition as interpreter, seems to give a clearer picture of its result than that which Kane has sketched.

This discovery of an Open Sea gives Kane occasion to make a comparison with other Polar expeditions, and he goes as far back as the days of Barentz in 1596, and "without referring to the earlier and more uncertain chronicles," he mentions the Dutch

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\* See vol. i. pp. 280-310. Petersen is a man well known to me. He was appointed foreman in the trading service at Upernivik. His communications bear the full impression of truth, and are written in a clear and simple style, without boasting and self-praise, although he has been of great service to the expeditions that he accompanied as interpreter—viz. Penny's and Kane's. He is now serving with Capt. McClintock.

whale fishers, Dr. Scoresby, Baron Wrangel, Captains Penny and Inglefield, and shows how they have all spoken about large openings in the ice around the North Pole. He shows likewise how these have all been found to be "illusory discoveries," and anticipates the objection that "his own may one day pass within the same category" by extolling the far larger scale on which *his Open Sea* has been observed. Petersen confines his remarks on this subject to the following :

"The Greenlander, Hans, was sent after them with the dog-sledge in order to continue the journey still farther towards the N., and when he reached their sledge (*i. e.* a drag-sledge that had been sent out earlier), he and the steward Morton proceeded onwards. They reached the Sound of which the Esquimaux had spoken. This Sound was open; probably cut up by the strong current they had observed there. It was, however, Midsummer, so that the sun had perhaps aided the current in getting away the ice. After this expedition no other such was attempted." \*

It is a known fact that here and there under the coast of North Greenland, places are found which, on account of the strong current, do not freeze, even in the severest winter, although the whole waters round them are covered with ice of two to four feet thick, and Kane himself remarks, that in the most rigorous cold he has found such stream-holes. As soon as the Spring commences these stream-holes expand themselves, as the ice in their neighbourhood is always thinner and sooner thawed, either above, by the sun, or below, by the under current.

Now, as Morton's expedition was undertaken at Midsummer, and as he found such an opening in the ice, not more than 90 miles from the place where they, the year before, had been able to navigate the vessel, and as there was an unusually strong current running in this opening, which just appeared where the Strait became smaller, nothing is more probable than that this opening was just such a stream-hole, in which opinion I must concur with Petersen, until stronger proofs be adduced in favour of the hypothesis of an Open Polar Sea, kept open by a branch of the Gulf-Stream deflected from Nova Zembla to the Pole :—a solution of a problem which has occupied Geographers since 1596, if not farther back, &c. &c.†

Next, as to what concerns the lands that are said to surround this enigmatical Sea with a coast of 90 to 130 miles in extent, which Morton measured almost at a single glance, and which Kane has been able to lay down on his chart, even with an exact coast margin, adorned with celebrated names, and accompanied in the text with correct statements of the heights of Mountains (Mount Parry), &c., &c., I must express a well founded doubt of the correctness of all this.

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\* See 'Erindringer fra Polarlandene,' p. 92.

† See Kane's 'Considerations,' vol. i. pp. 301-309.

The ship, as stated, was frozen in on the coast of Greenland, in  $78^{\circ} 37'$  N. lat., in the beginning of September, 1853. Of the expeditions that were sent out the same Autumn with boats or sledges, one reached, as presumed,  $79^{\circ} 50'$  N. lat. along the same coast. In March, 1854, Dr. Kane sent out a sledge expedition, which was obliged to return without result; the eight travellers who took part in it were in the greatest danger of being frozen to death; three of them had a foot or toes amputated, and one died a few days after his return. Of the later expeditions, the one under Dr. Hayes was directed towards the opposite, or American coast, which he traversed to  $79^{\circ} 45'$  N. lat. under great sufferings from snow-blindness. The others kept under the coast of Greenland, and did not get farther than Humboldt glacier, or about  $79\frac{1}{2}^{\circ}$  N. lat.; with the exception only of the one undertaken by Morton and Hans, who, according to their own statement, reached  $81^{\circ} 20'$  N. lat., from which point they supposed they had seen land as far as  $82^{\circ} 30'$  N. lat.; these two members of the expedition alone came to the *Open water*. The breadth of the whole of the northernmost part of Baffin Bay, thus explored, was from 8 to 16 geographical miles between the coasts of Greenland and America.\*

After the first excursions in the vicinity of their winter quarters, attention was directly drawn to the great Humboldt glacier, and Kane had an occasion, one clear day in April, to survey it closely; and then remarks:—

“My notes speak simply of the ‘long ever shiuing line of cliff, diminished to a well-pointed wedge in the perspective;’ and again, of ‘the face of glistening ice, sweeping in a long curve from the low interior, the facets in front intensely illuminated by the sun.’ But this line of cliff rose in a solid glassy wall, 300 feet above the water-level, with an unknown, unfathomable depth below it; and its curved face, 60 miles in length from Cape Agassiz to Cape Forbes, vanished into unknown space at not more than a single day’s railroad travel from the Pole. The interior with which it communicated, and from which it issued, was an unsurveyed *mer de glace*, an ice-ocean, to the eye, of boundless dimensions.

“It was in full sight—the mighty crystal bridge which connects the two continents of America and Greenland. I say continents; for Greenland, however insulated it may ultimately prove to be, is in mass strictly continental. The least possible axis, measured from Cape Farewell to the line of this glacier, in the neighbourhood of the 80th parallel, gives a length of more than 1200 miles, not materially less than that of Australia from its northern to its southern Cape.

“Imagine, now, the centre of such a continent, occupied through nearly its whole extent by a deep unbroken sea of ice, that gathers perennial increase from the waterparting of vast snow-covered mountains, and all the precipitations of the atmosphere upon its own surface. Imagine this, moving onward like a great glacial river, seeking outlets at every fiord and valley, rolling icy cataracts into the Atlantic and Greenland seas; and, having at last reached

\* See vol. i. pp. 225-228.

the northern limit of the land that has borne it up, pouring out a mighty frozen torrent into unknown Arctic space.

"It is thus, and only thus, that we must form a just conception of a phenomenon like this great glacier. I had looked in my own mind for such an appearance, should I ever be fortunate enough to reach the northern coast of Greenland. But now that it was before me, I could hardly realize it.

"I had recognized, in my quiet library at home, the beautiful analogies which Forbes and Studer have developed between the glacier and the river. But I could not comprehend at first this complete substitution of ice for water. It was slowly that the conviction dawned on me, that I was looking on the counterpart of the great river-system of Arctic Asia, and America. Yet, here were no water feeders from the south. Every particle of moisture had its origin within the Polar circle, and had been converted into ice. There were no vast alluvions, no forest or animal traces borne down by liquid torrents. Here was a plastic, moving, semi-solid mass, obliterating life, swallowing rocks and islands, and ploughing its way with irresistible march through the crust of an investing sea."

As Kane, in this section of his work, just expatiates upon the nature and quality of the whole of Greenland and its unknown interior, it is chiefly at this place that I must refer to my previously cited work; in the first section of which, at page 10, I have treated on the extension of the land-ice, and the origin of the floating icebergs. But as the subject is rather comprehensive, I will here confine myself to the following remarks:—

The interior, with which the glacier stood in connection, was: "an ice-ocean, to the eye, of boundless dimensions." That this ice-ocean could not be overlooked at that place certainly does not signify much with regard to its extent; but farther on, he remarked that it occupies the whole centre of Greenland, right down to Cape Farewell. Now, from what source does the author know this, as he only cites a few places, quite in the neighbourhood of his winter harbour, where he has followed the margin of the inland ice, and had never been in the fiords of Greenland, between Upernivik and Cape Farewell? I for my part have employed 8 years in examining to what degree the interior was covered with ice, by pursuing it from fiord to fiord; and nevertheless I have been obliged to confine myself to conjecture, with regard to many extensive tracts that lie between these fiords; and my own explorations in this direction, must, as we shall see, be supposed to have been unknown to him. In the account of his first voyage,\* he says of the Omenak fiord, that he could see into its mouth whilst sailing up the Strait; that its interior had never yet been explored, and that there was great probability that it passed right through the country to the Atlantic Ocean. But if we admit this central ice-ocean as existing, what does it then signify? that this ice-ocean moves like a great ice-river (from south to north?), rolling cataracts of ice out to both sides in the Atlantic and Green-

\* 'Grinnell Expedition,' 1854, p. 53.



land seas, until it reaches the northern boundary of the country, and there pours forth a mighty frozen stream, Humboldt glacier, in that unknown Arctic space? I cannot follow the author in his bold flight over the icy desert of Greenland, and still less can I conceive that he, in all this, only sees a confirmation of what he had already earlier foreseen in his own mind, if he "*should ever be fortunate enough to reach the northern coast of Greenland,*"—that which he presumes to have discovered on this expedition. The reality is, that wherever one attempts to proceed up the fiords of Greenland, the interior appears covered with ice; but there is no reason whatever to assume that this applies to the central part of the country, in which one, on the contrary, just as well may assume that there are high mountain-chains, which protrude partly from the ice. A remarkable movement is found in this ice-mass; but this is so far from having a kind of main direction after the central axis of the land towards the Humboldt glacier, that this arm of the ice, on the contrary, seems to belong to those that are in a less degree of motion, whereas the greatest agency takes place around Jakobs-havn ice fiord, Omenak fiord, and others. Farther, this movement can only be measured by the masses of ice that pass annually out of these fiords, and of which one can only obtain a tolerable conception by remaining for a long time at the mouths of the fiords. These ice-fiords point out probably the rivers of the original land, now buried under ice. Whereas no conclusion can be drawn from the ice itself and the appearance of its branches that go down to the sea, for it is almost quite uniform everywhere, from Julianehaab to Upernivik.

The author, in concluding his remarks, says it was first when he saw Humboldt glacier that Forbes's and Studer's idea of the likeness between the glacier and the river began slowly to dawn on him; but the same species of glacier, which these celebrated naturalists have examined on the Alps and in Norway, is found in many places on outer-Greenland, or what I would call ice-free Greenland. These Kane had seen at Disko, near Upernivik, and other places, before he reached "Humboldt glacier." In order to examine its signification in comparison with the rest of the branches of inland ice, he must have made observations and calculations of how many icebergs it annually yielded to the sea, as from its appearance he could scarcely form any opinion. By seeing such a branch of inland ice, on account of the uniform ice-plateau whence it issues, one gets a smaller impression of its similarity with a river than by seeing the Alpine glaciers and the glaciers on the outer coast of Greenland, as these just fill up cliffs which—to judge from their form—must be beds of watercourses. Those arms of inland ice, which send scarcely any ice into the sea, show, on the contrary, about the same appearance as those that send out annually thou-

sands of millions of cubic feet of ice into the sea, and therefore must be supposed to be maintained by river territories of many hundred geographical square miles.

I now proceed to examine its signification as a sort of connecting link between Greenland and the American continent. Dr. Kane says "it was in full sight—the mighty crystal bridge which connects the two continents of America and Greenland;" and afterwards, in a note, "I have spoken of Humboldt glacier as connecting the two continents of America and Greenland. The expression requires explanation, &c." Difficult as it is to understand, Dr. Kane seems to mean that Greenland is separated from, and therefore half connected with, the Arctic-American Archipelago by a less broad Sound, beyond Humboldt glacier.

Petersen says, that Kane himself would have undertaken an excursion to the north in the middle of April, 1855, but that he could not get the Esquimaux to accompany him, as they would only go bear-hunting around the ice-cliffs near Humboldt glacier, and thus Kane was only absent 24 hours on this tour. Kane says that as he could not reach the Open Water, he sought compensation in a closer examination of the great glacier, of which he now again takes occasion to give a lively description, concluding with the following allusion to the previously-mentioned idea of the connection between Greenland and America:—

"Thus diversified in its aspect, it stretches to the north till it bounds upon the new land of Washington, cementing into one the Greenland of the Scandinavian Vikings and the America of Columbus."

In the earlier sections there is spoken of the extension and movement of the inland ice: here is specially mentioned the manner in which the floating icebergs tear themselves loose from that side which goes out to the sea—the *calvings*, as they are called in the ice-fiords. None of those engaged in the expedition had had an opportunity to make direct observations in these respects. In order to obtain the necessary prospect, Kane climbed up "one of the highest icebergs," whilst his fellow-travellers rested themselves. From here he meant he could see that

"The indication of a great propelling agency seemed to be just commencing at the time I was observing it."

It appeared to him as if the split-off lines of the fast land ice, which signify the beginning of the loosening, were evidently about to extend themselves. As the *calving*, however, did not follow, Kane confines himself to remark respecting it—

"Regarded upon a large scale, I am satisfied that the iceberg is not disengaged by *debâcle*, as I once supposed. So far from falling into the sea, broken by its weight from the parent glacier, it rises from the sea."

He next adds that

"The idea of icebergs being discharged, so universal among systematic

writers and so recently admitted by himself, seems now to him at variance with the regulated and progressive actions of nature."

By this I conclude that Dr. Kane had not seen my work on North-Greenland, or, at all events, that part of it which treats of the extension of the land-ice and the origin of the floating icebergs, and wherein it states—

"But from what has been already mentioned, it must be evident that the icebergs must not be considered as breaking loose and falling down from precipices; one might rather say that they lift themselves," &c. &c.

That Kane did not know this is certainly very striking to me, as the literature which treats of the glaciers of the Polar lands, and especially those of Greenland and the origin of the icebergs, is not great. Dr. Kane had sought information respecting the nature of the country in our Danish colonies, and as my above-mentioned work is cited in his own, if not by himself, still by his assistant, Charles Schott, in the Appendix XIII., p. 426.\* He says also, at page 150, that the height of the ice-wall at the nearest point was about 300 feet, measured from the water's edge. As a consequence thereof the floating icebergs, which lay before it and were detached from this ice-wall, must have been, on the average, above 300 feet, if they should be imagined as formed by an elevation during the time of being detached.

I have accurately measured many frozen icebergs, particularly in the winter, on Omenak fiord, and I have thereby come to the result that the common height of the larger ones, and especially of those that may be supposed to lie, in some measure, in the original position which they had had after their breaking loose, was somewhat more than 100 feet. I have also measured them as high as 150 feet, and I have seen some that I should estimate at 200 feet high; but this was when there were points or edges that had come to jut upwards by the mighty ice-block having turned and changed its position in the water. That the whole of the collected mass of icebergs before the Humboldt glacier should have been considerably more than 300 feet in height generally—the highest, consequently, even 500 feet—I can certainly not disprove; but I must strongly doubt.

We now come† to the remarkable sledge expedition of Morton and Hans, on which they first passed the whole exterior margin of the great glacier, with the icebergs lying before, and those torn from it and floating about; they then drove farther towards the north, found the ice more and more unsafe, and were at last interrupted by the Open Sea, when they drove some distance along the shore, and lastly Morton went alone on foot as far as he could to

\* See also Journal of Royal Geographical Society, vol. xxiii. p. 145.—ED.

† See vol. i. pp. 280-310 of Kane's Work.

obtain a survey of the navigable water farther towards the north. The whole journey, from the moment they saw the Open Sea until they were compelled to return, after a very difficult passage, during which they were also bear-hunting, lasted only three days, or from the 21st to the 24th of June.

What Morton saw in these three days is the foundation for the whole theory of Kane's Open Polar Sea, and whatever stands in connection therewith. Kane gives us this account with his own explanations, and in a separate Appendix he has communicated Morton's own journal. It is stated that this man had instruments with him to determine the geographical positions. As far as I can judge from the chart, as laid down in the first volume, and from the Appendix No. VI.,\* more than 20 points of longitude and latitude are determined by him on that toilsome journey beyond the Humboldt glacier, besides the numerous points on the opposite coast, to which they did not come, and which, therefore, appear to be laid down only after bearings.

When I consider the great haste required to reach the farthermost point towards the north, and to return before the ice broke up, the very difficult and toilsome passage through deep snow, over openings, the most trackless ice-walls, &c. &c., I cannot sufficiently admire Morton's dexterity in attending at the same time to these observations which require so much repose and accuracy.

The travellers drove past the floating icebergs that were torn loose from the glacier and lay piled up before it. Several reasons are adduced to show that it could be ascertained that they were formed or torn loose very recently, as they had a fresh shining surface and no projecting foot under the water. It is, however, especially from the accounts given of this place, that I conclude that the Humboldt glacier does not belong to the most active of the inland ice-streams of North-Greenland. The icebergs lay only a few Danish miles out from the fast land ice, and one must consider that they have perhaps taken several years to be filled up, as all the navigable waters thereabout were frozen; they could scarcely come out any other way than towards the south, and this passage perhaps opens only now and then in different years. The great ice-fiords that are known in North-Greenland are annually cleared of great masses of ice, that are driven to sea. If this were not the case, the inner navigable waters would soon be stopped up, and the incessantly-propelled land-ice extend itself over the surrounding land.

After having passed the icebergs, they came to the place where the sea-ice on which they drove became thinner and thinner, so that the dogs trembled, and at last they durst not drive farther on

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\* The *astronomical* observations obtained by Morton\* are three meridional altitudes of the sun.—ED.

it, but sought the land, or rather the firmer ice-edge that lay immediately along the shore. At last the ice gave place for quite open water, and here it is stated, at page 288, that—

“The tide was running very fast; the ice-pieces of heaviest draught floated by nearly as fast as the ordinary walk of a man, and the surface-pieces passed them much faster, at least four knots.”

Kane has already given an excellent description of a stream-hole; but had it been the margin of the Open Sea moved by the swell, the ice would have kept its thickness, at least to some extent, just as one approached it, but it would have been broken, screwed up, and thus more or less in drift. In short, such a margin of ice is cut off sharper, with respect to thickness, whereas a successive transition from ice to water is found around a stream-hole, *for which reason it is so dangerous to approach such places.* The above-mentioned tide-stream of four knots is even so strong, that one (particularly as it was in a pretty large sound, and not in a narrow pass of some few yards in breadth) can already conclude that in such a place no ice would be able to hold in the month of June, even to a considerable circumference. Even farther up Morton observed that the ice-pieces drifted at the rate of four miles an hour, and that the stream varied first from north to south and then from south to north, just as is the case everywhere in the inner navigable waters along the coast of Greenland, originating from the ebb and flood. (*See vol. ii., p. 376.*)

The last-mentioned observation was made by Morton on the 22nd of June, consequently there was not until that moment the most remote reason to suppose an Open Polar Sea. The Sound had likewise a direction north, and there was thus no sign whatever that the coast under which they found themselves turned towards the east, or that they found themselves *at the end of Greenland.* We will now consider the adventures of the two following days, after Morton's own description (vol. ii., pp. 377, 378). These adventures form the main foundation for the ideas about the end of Greenland—the Open Polar Sea—the Gulf-stream, which warms up the Pole—the solution of that problem which has occupied the geographical world since 1596, &c. &c.; and with these must stand or fall the whole of that splendid building, of which Kane has sketched a drawing in vol. i., pp. 301-309.

On the 23rd of June Morton and Hans started, but not before noon, in consequence of a continued gale from the north, but after driving about 6 English miles they found the ice along the coast quite broken up and impassable. They therefore made a halt with the sledge, and undertook a journey on foot, but returned and encamped by the sledge.

The following day, the 24th of June, they started on foot very early in the morning; their intention was to come past a high

cape, behind which there was still hope that they could get a free prospect towards the east, and thus see the end of Greenland. After a very toilsome wandering, as they were sometimes obliged to crawl over cliffs and sometimes to spring over loose floating pieces of ice, they fell in with a she bear and her cub, which they killed, and then boiled a strengthening dish of the flesh on the spot, as they found some plants and a piece of a sledge, whereof they made a fire. As yet nothing was discovered that could lay the foundation to the above named theories, and nevertheless all was to be attained before the following day. On account of the importance of the events that occurred between, I will give Morton's statement, as it will be found in the place cited:—

"After this delay (the bear-hunting) we started in the hope of being able to reach the Cape to the north of us. At the very lower end of the bay there was still a little old fast ice over which we went without following the curve of the bay up the fiord, which shortened our distance considerably. Hans became tired, and I sent him more inland where the travelling was less laborious. As I proceeded towards the cape ahead of me the water came again close in-shore. I endeavoured to reach it, but found this extremely difficult, as there were piles of broken rocks rising on the cliffs in many places to the height of 100 feet. The cliffs above these were perpendicular, and nearly 2000 feet high. I climbed over the rubbish, but beyond it the sea was washing the foot of the cliffs, and, as there were no ledges, it was impossible for me to advance another foot. I was much disappointed, because one hour's travel would have brought me round the cape. The knob to which I climbed was over 500 feet in height, and from it there was not a speck of ice to be seen. As far as I could discern the sea was open, a swell coming in from the northward and running crosswise, as if with a small eastern set. The wind was due north—enough of it to make white caps—and the surf broke in on the rocks below in regular breakers. The sky to the north-west was of dark rain-cloud, the first that I had seen since the brig was frozen up. Ivory gulls were nesting in the rocks above me, and out to sea were mollemoke and silver-backed gulls. The ducks had not been seen north of the first island of the channel, but petrel and gulls hung about the waves near the coast."

"June 25.—As it was impossible to get around the cape I retraced my steps," &c. &c.

With this, the exploration of the open Polar Sea,\* and the farthest lands on our globe, was ended. Morton felt himself disappointed in not being able to come past that terrible Cape, which hid his prospect towards the east. I, for my part, was not disappointed on reading that such a hindrance arose before him. I know it

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\* With reference to the latitude of the northernmost point reached by Morton, he states in his Journal, p. 378, vol. ii., "We arrived at our camp where we had left the sledge at 5 p.m., having been absent 36 hours, during which time we had travelled twenty miles due north of it. June 26th.—Before starting I took a meridian altitude of the sun." This observation is worked at page 388 in the same volume, where the result appears as .. .. 80° 20' 2"

Add 20 miles according to the above remark .. .. 20 0

Latitude of the farthest point reached by Morton .. 80 40 2

from sad experience, as I, during three consecutive winters, have followed the winding coasts of North Greenland in dog sledges, in order to lay them down on my chart. I know these bewitched points which continue to shoot forth when one thinks one is at the end of an island, these endless promontories which one must come past before one can reach the right promontory, and can turn round; these hills—these eternal tops—that shoot up when one ascends the cliffs, before one reaches the right top, whence one can have the wished-for prospect. I have passed half a day thus only to get the wished for general view over one single fiord-arm, and that even sometimes in vain. What must it then not be, when one on an afternoon, and on foot, seeks to reach the unknown end, to use Kane's own words, of a "whole little Continent?"

We will now return to Kane's representation, and, on account of its considerable extent, confine ourselves to inquire into the most important conclusions, through which he comes to such great results from the facts communicated above.

Dr. Kane remarks in several places, that although it blew a strong and almost stormy north wind during those days when Morton travelled along the open water, there came only some few half-dissolved pieces of ice drifting from the north, and at last none at all. This shows, if one will draw any conclusion whatever from it, that the navigable water, a good way from the mouth of the narrow pass, in which the stream was so extremely rapid, had been covered with *still good winter ice*. For if it were really on the border of the open sea one might expect to find much loose drift-ice between the margin of the fast ice over which they had driven, and the quite open sea; and there was a great probability that such drift-ice must appear and press on during a continued north wind. A sudden beginning of a perfectly ice-free sea is scarcely to be imagined.

An important criterion whereby to judge if one has open water, is the *ground-swell* of the sea. This is seen at Julianehaab, when the ice from the east coast is expected in the spring. To look after the ice itself from hills of some hundred feet in height is not of much use, for if it be first in sight it is also very near, and in a short time is on land. But in general one can know its proximity by the cessation of the ground-swell several days beforehand. To observe this with certainty the weather must be quite still, for the swell which even a common wind produces makes the observation uncertain. Kane adduces the swell and surge as proofs of the Open Polar Sea; but as it is expressly stated that *it blew almost a storm the whole time*, the effects of such a storm on an open surface of the sea, of possibly 20 or 30 miles in extent, are sufficient to make the presumed observation perfectly invalid.

Still more uncertain does the observation of Morton appear to me, that the swell caused by the wind from the north, which he pretends to have remarked from the farthest point of land, was acted on by another swell from the east, behind that Cape which concealed the end of Greenland and the beginning of the great Polar Sea from his view.

A third fact which Kane adduces in favour of his theory of the Polar Sea, is the increasing abundance of animals and plants in the district to the north of the glacier. It is mentioned in particular that seals and sea-fowl were seen in great numbers in, as well as around the neighbourhood of, the open water. Passing over the more cursorily touched observation, that the birds flew in an eastern direction behind the oft-mentioned Cape which Morton could not come past, I shall only remark that I, on the contrary, regard that flocking together of sea animals and birds as a sign of one single opening in the sea, the rest of which was covered with ice. Such openings are just characteristic gathering places for seals and sea-fowl. Nor do the plants which the Greenlander Hans is said to have seen, but no specimens of which were collected, and which, from his bare description, are determined and inserted with Latin names of their genera and species at page 462, appear to afford any weighty proof of the Open Sea and an increasing mildness of climate towards the North Pole.

I now come to the real question, the *knob* to which Morton climbed when he could not come farther, and from which he, "as far as he could discern," found the sea *Open*. He says that it was over 500 feet in height, though he likewise remarks that the cliffs around, to a height of 100 feet, which were difficult to reach, were quite perpendicular. As far as I can make out, this is the same point to which Kane, at page 299, gives a height of 300 feet; at page 305, of 480 feet; and lastly, at page 307, where he compares it with the points from which former expeditions are supposed to have seen the open sea, of 580 feet. How this very doubtful height was measured, is not mentioned, and yet it is from this position that the size of the surveyed *open* space is to be given. Nor have I been able to find due information of how clear the air was, nor where the sun was at that time. Morton speaks of a dark rain-cloud in the n.w.; and a delineation of the open sea, with Morton in the foreground, "*from description*," as it is called, is also given at page 307. But with the exception of a mysterious round body bathing one half in the sea, but which cannot be the sun at this season of the year, a long way above the horizon, even at midnight, one sees nothing but the sea bounds bordering the horizon. Neither is it quite clear in what



direction the oft-mentioned Cape concealed the prospect towards the east. We see the coast-line on the chart broken abruptly off by the farthest point that Morton saw. We ought to have the necessary information about all these questions in order to judge of the correctness of the calculations by which Kane, at page 302, came to the result, that Morton could see from his "look-out" to a distance of 36 miles, and that he had consequently surveyed an Open Sea of more than 4000 square miles. Every one acquainted with the nature of "*looking out*" after ice will admit the folly of determining with certainty, by sight alone, from a height of some few hundred feet, that flat ice is not to be found on the sea in the farthest margin of the horizon, or at a distance of 36 miles. If even, as I much doubt, it could be possible, under very favourable circumstances, to discover it at such a distance if it were there, it however becomes an impossibility to determine its absence with certainty. If we now remember that the part of the sea which Morton had already passed, after he left the Humboldt glacier, was kept open by the strong current, that this stream-hole must be regarded as one of the most unusual on account of its breadth, and that it is not at all decided if this strong current did not continue past Cape Jefferson, on which he stood, it appears probable that such a stream could continue its thawing activity far past this point; and even if it were correct that there had not been ice 36 miles out before this channel-opening, there is, however, no reason to seek such distant causes as those which the author has assigned in order to explain this phenomenon in another manner. Should there really be an open Polar basin in the summer, or at certain other periods, there is at all events no reason to suppose that this Open Sea had been reached by this expedition.

In conclusion, let me touch on the coasts discovered on this expedition, as represented on the chart at the beginning of the first volume. They who know how deceptive it is to look at the configuration of such high mountains at a distance from the sea, how all melts together, islands are taken for continents, promontories for islands, and deep spacious fiords and sounds quite disappear, will certainly agree with me in admiring the boldness with which the opposite coast, from Cape John Barrow to Mount Parry, an extent of more than two degrees of latitude, which they approached at the very nearest, at a distance of 25 to 40 miles, is found marked out on the said map as a clearly defined connecting shaded line, making only a little curve towards the east, in order to limit the Open Polar Sea, and, as if to receive the Gulf-stream, said to flow from Nova Zembla, and lead it down through Smith Strait to Baffin Bay. The heights of the mountains,

according to the guessed distances, are on the other hand just as remarkable as determining the distances without knowing the heights of the mountains. The farthest mountain-top that Morton saw—"the most remote northern land known upon our globe"—has been put at 2500 to 3000 feet, and 100 miles from Morton's last station. Notwithstanding this great distance Morton saw however that the top was bare, and that it was striped vertically with projecting ledges. Beyond this *ultima Thule*, about 60 to 80 miles from Morton's farthest station, and as it seems partly behind the Cape which stopped his view, is indicated "*open sea*." Had Morton only passed round his Cape he would possibly have seen fresh capes shooting forth incessantly until he reached Mount Parry, which might have been thus connected by a neck of land with Greenland, and again on the other side large bays and sounds might have opened themselves on the American side and broken off the line now so nicely laid down on his map.

I have thus exhausted the most important points respecting these discoveries, which are represented as the crowning glories of the expedition. These Polar expeditions were dispatched for the discovery of the North-West Passage and of the remains of the Franklin Expedition, and both these problems have been solved by British enterprise. So far as they fall short of the finding the remains of Franklin or of the North-West Passage, they do not promise any advantages that can in any way answer to the means and efforts they demand.

Dr. Kane has undeniably gone beyond what he promised in his preface, namely, to give a simple narrative of the adventures of his party; and he has hereby, in my humble opinion, injured more than benefited his work; and the numerous really interesting and remarkable elucidations concerning the nature of North Greenland, obtained by immense labour and rare efforts, are thereby in a manner cast in the shade. Every one who interests himself for the Arctic regions will, in Kane's work, find valuable contributions to their description. Let me, among others, especially point out the description of the mode of life of the inhabitants of those northern regions; the remarkable abundance of walrus, bears, and other animal life; the observations on the growth of plants, and on the temperature, as well as those respecting the formations of ice on sea and land, &c. &c.\*

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\* See "Proceedings" R. G. S., vol. ii. pp. 195 and 359, also vol. iii.—Ed.

IX.—*The Yang-tse-Keang and the Hwang-Ho, or Yellow River.*

By WILLIAM LOCKHART, Esq., F.R.G.S.

*Read, April 26, 1858.*

It is not my intention at present to enter minutely into the geography of the mighty Yang-tse-Keang, but rather to state various particulars regarding it, and show the great importance of it as an inlet into the Empire of China.

This river is formed by the junction of three small streams in Tibet about longitude  $89^{\circ}$  E.; but little can be said respecting its course at this distant and unvisited point, until it enters China in the province of Yunnan, the richest mineral district of the country.

The Yang-tse-Keang is called by the Chinese “The girdle of China,” traversing as it does the whole of the centre of the empire, and rolling its flood of waters to the sea, through the richest and most fertile part of the country.

As the Hwang-Ho, or Yellow River, is called “The trouble, or grief, of the sons of Hona,” which from the rapidity of the stream and the quantity of clay-silt it brings from the mountains, gives it a great liability to burst its bounds and flood the country, so on the other hand, the Yang-tse-Keang is the blessing of the country on account of its being the main channel of communication between so many and so important cities and districts, and also by its irrigating and draining the whole centre of the land. Indeed its importance to China cannot be too highly estimated, and it may safely be asserted that there is no river in the world, which has on its banks so numerous a population, amounting to at least 100 millions of people, who are sustained by its waters in the pursuits of commerce and agriculture. There are more than 100 cities of the 1st, 2nd, and 3rd classes, and 200 towns and villages, which can be approached directly from its water-way. From its origin in Tibet to its outlet at the sea, its course is about 3000 m., the two points being distant in a direct line 1850 m.; and the basin drained by its channel being nearly 800,000 square miles.

The Yang-tse-Keang enters China on the borders of the province of Sze-chuen, the province of the four streams. After traversing the N.W. part of the province under the name of Kin-shia-Keang, or Golden-sand-river, it passes into the province of Yunnan. This province is celebrated throughout all China for its great mineral riches — viz., cinnabar, vermilion, quicksilver, orpiment, copper and brass, which are sent to every part of the country; the compound metal, white copper, which is made here, strongly resembles German silver, and is used for similar purposes. Part of this province is covered with forests, in which the

larger wild animals abound, such as the elephant, rhinoceros, tapir, tiger, &c.

The river leaves this province towards the N.E. after receiving a large stream from Yun-nan-foo, the capital, and re-entering Sze-chuen, traverses its s.e. portion, where it receives the large river Yah-lung-Keang from the north, till, at the city of Seu-chow, it receives the Min or Wei river, which comes from Ching-tu-fu, the capital of the province. At this place some Roman Catholic Missionaries were executed a few years ago. After the junction of the two rivers, the main stream loses its name Kin-sha-Keang, or River of the Golden Sand, and takes that of Ta-Keang, or Great River.

In this province it receives three or four other large streams, as the Kia-ling and others, which drain the southern slope of the Pih-ling, or northern mountain-range, and increases its body of water very considerably. The province of Sze-chuen is very rich in products and mineral wealth, and it exports musk, rhubarb, and various other drugs—rice, wheat, tea, silk, and horses—gold, lead, coal, and salt. It is in this region that the celebrated Artesian wells are dug to the depth of 1200 and 1400 feet, and where are the famous springs of inflammable gas, which is used both for illumination in a rough manner, and for the evaporation of brine from the salt springs.

The river now flows in a N.E. course, and leaving the province on the eastern border, enters that of Hu-pih (or province north of the lakes), at an opening in the chain of Woo mountains, between the cities of Kew-chuen and Pa-tung. It then takes a southerly course to the borders of Hu-nan (or province south of the lakes); but does not enter this latter province, though it here receives the waters from the large lake Tung-ting-tu, through the rivers Seang, and Yuen, and other streams of less volume, being the drainage of the whole of the northern slopes of the Nan-ling, or southern mountain range. Many affluents join the river here from the numerous lakes that lie between these two provinces of Hu-pih and Hu-nan, since called conjointly Hu-Kwang (the provinces of the broad lakes); from these additions the size of the stream is increased to double its former volume. In this region the largest coal and iron fields of the empire are found, and are constantly worked for the supply of all places in the river. The course of the river is then N.E. to the capital of the province, Wu-chang, where the Hu-Kwang or Hu-river (which gave its name to the most illustrious family that ever reigned over the Empire) joins the Ta-Keang, whence the main river to the sea is called Yang-tse-Keang. This Han river is a large navigable stream formed by several smaller branches, which drain the

country to the north, namely, those southern portions of the provinces Shen-se and Hu-nan which lie south of the great Tsing-ling and Meu-ta range of mountains, and it has on its banks many large and populous cities.

The city of Wu-chang-fu is 500 miles from the sea and is situated at the confluence of the Han-Keang and Ta-Keang, but on the south bank of the eastern or larger stream; Han-yang-fu, another large city, is on the west bank, while Han-kow is on the north bank or angle, formed by the junction of the rivers. In these three places there were, before the troubles consequent on the present rebellion, as many as five millions of people. At this mart of commerce the great barter trade between the north and south of China is carried on. An immense fleet of native vessels, said to be 10,000 in number, and the large rafts of timber from the forests in the n.w., brought down the stream to this point, cover a large portion of its surface. The products of Hu-kwang, besides the iron and coal referred to, are large quantities of rice and other grains; silk, cotton, tea, paper, wax cloth, lead, copper, silver, and malachite, are also brought from that place.

Though Wu-chang and Han-yang are large cities, and have their share of the trade carried on at this point, it is at Han-Kow, an unwallled town, that the largest portion of it is managed, and persons coming to Shang-hae seldom mentioned the other cities, but spoke only of Han-Kow as being the great central depôt of commerce, owing to the confluence of the above-described navigable rivers which in their course traverse so extensive a region. Persons engaged in every variety of trade resort to Han-Kow, for the exchange of their respective commodities; men from the north and west, from Mongolia to Tibet, and Sze-chuen, bring here wheat, rice, dried and salted vegetables of every kind, bamboo sprouts, horses, sheep, furs, skins, coal, lead, jade or nephrite, gold in large quantities; rhubarb, musk, wax, and various drugs of northern growth, and exchange them for tea, silk, camphor, opium, various southern drugs, and above all for very large quantities of Manchester and Leeds goods. The quantity of long cloth and cotton goods that pass through Han-Kow is probably more than half of the whole quantity brought to China; hence may be deduced the great importance of securing access to this spot, as one of the arrangements to be shortly made in China. It has long been much desired by merchants that they should be able to inspect personally the trade of this place, and take part in it, as from the accounts brought by native traders, it would appear that this is one of the most important, if not the most important, mart in all Asia. Owing to the winding course of the river and its rapid stream, sailing vessels would have much difficulty in

reaching Han-Kow, so that small steamers would need to be exclusively employed in this service; the sea-going vessels would bring their cargoes to Shang-hae, which could thence be carried by steamers up the great river. Thus, the foreign merchant would be enabled to communicate directly with his customers, instead of having to deal with these northern traders, through two or three sets of intermediate agents. I believe the importance of gaining access to Han-Kow cannot be over estimated. The width of the river is at this point from 2 to 3 miles, with a depth of water quite sufficient for steamers and vessels of 300 or 400 tons burden; probably larger vessels might find water enough.

These three places have, since the year 1853, changed hands between the imperialists and rebels four or five times; extensive fires have swept away large numbers of streets, and two years ago Han-Kow was almost totally destroyed; but the impetus given by the elasticity of trade will soon cause the place to be rebuilt. No doubt, ere this, it is resuming its usual appearance, for though many traders who lived there in former years have been ruined, still the advantages of position are as great as ever, and the usual practice in China under such circumstances is, for monied men to lend funds to persons whom they can trust, at a large interest, and thus enable them to recommence an extensive business, the borrowed capital being gradually cleared off as opportunity offers.

After leaving Wu-chang, the course of the river is s.e. to the city of Kew-Keang, near the Poyang lake in Keang-se (or province west of the river); this city is 400 miles from the sea, and to this point the tides are perceptible. The river here receives an increase to its waters through the Poyang lake from the rivers Chang-Keang and Kin-Keang, which drain the province of Keang-se as far south as the celebrated Mei-ling pass, situated in the mountains between this province and that of Canton, and through which all the northern grown teas are carried to the city of Canton. After leaving the lake, the river takes an e.n.e. course into the province of Ngan-Hwuy, where it passes many populous cities, opposite one of which, Wu-hu, 100 miles above Nankin, and on the south side of the river, the large United States steamer *Susquehanna* anchored on her visit to the Yang-tse-Keang. Thus it is clearly proved that large ships can readily pass up the river when its channel has been properly surveyed above Nankin, as it has been between that city and the sea.

Continuing its e.n.e. course, the river passes into the province of Keang-su, which with the province of Ngan-Hwuy forms the united province of Keang-nan; this is united with the province of Keang-se, under the Government of one Trung-t'uh or Governor-General, under the name of Leang-Keang, (or two river pro-

vinces). The whole of this district is decidedly the richest in the empire. In Ngan-Hwuy are produced silk, green tea, Chinese ink, and the famous varnish or lacquer. In Keang-se are the potteries whence come all the fine sorts of porcelain; the clay, feldspar, and quartz needed for this manufacture being found here. The city of Kin-te-chin is the chief seat of this trade. Tea and paper are also largely produced in this province. In Keang-su large quantities of rice, wheat, barley, white and yellow cotton, and silk, are produced; and in many of the principal cities are the manufactories from the looms of which the silks, satins, crapes, and gauzes so much admired in Europe are sent forth.

Nanking, the capital of the united provinces, under the name of Keang-ning-fu, is situated 200 miles from the sea. It was formerly the capital of China, but on the accession of the present Manchow dynasty the Court was removed to Peking; consequently much of the importance of this city ceased, and its population has since been chiefly occupied with silk weaving in its various forms. It was at this point that our fleet anchored in deep water, in 1842, when the last Treaty was made. The centre of the river is very deep, indeed too deep for an easy anchorage, while near the bank even, a depth of 20 fathoms was found, so that the ships anchored among the rushes. There is a great difference both in the breadth and depth of the river in the winter and summer. The expedition of 1842 was at Nankin in July. At this time of the year the river is full of water, owing not only to the heavy rains, but to the melting of the snows on the mountains of Tibet; but in the visits that have been paid to the river since that time, during the winter season, much less water was found in the channel; and its breadth being much diminished, what formerly looked almost like a lake was dry land, though the mid-channel was still very deep.

Hence the river takes an easterly course, passing Kin-shan (Golden-island), Shaou-shan (Silver-island), and the rich city Yang-chow-fu, which, with Kwa-chow on the north bank of the river, are situated at the mouth of the Grand Canal on that side; while Chin-Keang-fu (City Citadel of the River) is at the mouth of the canal on the south side of the river.

At this latter place a large fleet of native vessels was always anchored, as it was a place of extensive trade; but of late years, owing to the occupation of these cities by the rebels, the trade has been extinguished for a time, and the cities themselves almost wholly destroyed.

Hence the river, increased by its various affluents to a mighty stream, takes its course to the sea, into which it falls at the large island of Tsung-ming (latitude  $32^{\circ}$  N., and longitude  $122^{\circ}$  E.), which divides the stream into two wide deep mouths. This

island has been formed by the clay and sand brought down by the river, and constant additions are being made to its extent. The quantity of water flowing from the mouth of the river is so great, that notwithstanding the strong tides of this region, the water at the island of Gützlaff, 50 miles from Wu-sung, situated opposite the Yeang-tse Cape, but out of sight of land, is usually so fresh that vessels can water there. The Wu-sung river, on which the important port of Shang-hae is placed, falls into the Yang-tse-Keang at the town of Wu-sung. At this port of Shang-hae a vast foreign trade has sprung up within the last 15 years: the quantities of silk and tea that have been brought thence have made it a proof of the power of commerce, and the handsome foreign settlement that has been so speedily built, attests its importance and surprises all visitors. The place was first opened to foreign trade in 1843; at that time the site of our settlement was a dock yard, with a few sheds and timber-yards upon it; the land was bought by our merchants, the surface raised, roads laid out, and handsome houses built; the place is still increasing and will probably continue to do so as the trade advances, when the navigation of the great river on which it stands is thrown open. The foreign settlement is on the north side of the large native city of Shang-hae, which has been from ancient times a place of extensive native trade; this place being the port for the rich and flourishing city of Shu-chow, 80 miles distant in the interior, with which it communicates by a branch of the Grand Canal which passes the foreign settlements.

It may be seen from the above account, that it is of the utmost importance that the navigation of this great river be thrown open to foreign enterprise, being as it is the great line of communication through the centre of the land, and its free navigation equally important to all, whether missionaries, merchants, or travellers.

*On the important changes that have lately taken place in the Yellow River.*

The present notice of the Hwang-Ho, or Yellow River, is not intended to give its exact course, but to describe the remarkable changes that have lately taken place in its main channel. The river rises in Tibet, near the Kwan-lun mountains, in lat.  $35^{\circ}$  N., and long.  $34^{\circ}$  E., and disembogues itself in lat.  $34^{\circ}$  N., long.  $121^{\circ}$  E. By looking at the native map it will be seen that the mouth of the river projects into the sea, owing to the quantity of sand brought down by its stream.

As the Yang-tse-Keang drains the southern slopes of the mountains of this region, so the Hwang-Ho drains the northern slopes. The course of the river is very tortuous, and its stream so



rapid, that although a splendid river its navigation is almost impossible, and though it passes several important cities it is not in any respect so useful a river as the Yang-tse-Keang. Its waters carry so much clay and sand that they are of a yellow colour, which gives origin to the name of the river. The deposit of this sand in its bed has caused a gradual elevation of the whole of the water-way, until the stream passes through the Empire at an elevation of several feet above the surrounding country, giving rise to frequent inundations from the breaking of the banks or bunds, erected on the river-brink, which alone restrain the stream to its bed. While resident at Shang-hae, accounts were frequently brought from the north that the Hwang-Ho had burst its banks and devastated the country, many of the inhabitants being drowned, and the rest obliged to leave their submerged towns and seek a living as beggars where they could. These were called Nan-min (distressed or destitute people), and all the towns or villages they passed through had to contribute to their support. A line of route was given to them officially: to this they adhered, and received the money collected for them.

About two years ago, Mr. Wylie, of the London Missionary Society at Shang-hae, undertook a journey to the Yellow River, hoping to reach Kai-fung-fu, the capital city of the province of Hu-nan (or province south of the river), where the only colony of Jews at present in China exists. From circumstances over which he had no control, he did not reach Kai-fung-fu, but stayed at Tsing-Keang-poo, at the mouth of the Grand Canal where it opens to the river. Mr. Wylie says, that on ascending the bank, which is 30 feet above the out-lying country, instead of finding the rapid and turbid current he expected, a sandy plain stretched before him for a mile or more in width, slightly depressed in the centre, where there ran a small stream of water of a few yards in width, and some 1 or 2 feet deep. This was not the remains of the large river, but resulted from the introduction of some small streams higher up the country. Men, women, and children were walking across it in various directions, while the busy concourse of pedestrians, wheel-barrow drivers, donkeys and mules in the dry bed, now the high road, presented a peculiarly animated and interesting scene. It was ascertained from the natives that the bank had given way on the Shan-tung, or northern side, between 400 and 500 miles above Tsing-Keang-poo; and the consequent inundations in that province of Shang-tung have been the cause of much distress. A letter, since received from the north, intimates that the erratic waters have formed an escape into the Gulf of Pih-che-le, having swollen and overflowed the rivers in that direction to an unusual degree; and that a very large portion of the pro-

vince of Ho-nan was under water. The course of the Grand Canal through the provinces of Shan-tung and Che-le is that of one of the ancient mouths of this river, opening near the port of Teen-Tsin on the Pei-ho river, which was deepened, and widened into the canal. In Chinese history it is shown that the present is not the ancient site of the mouth of the Yellow River; its former outlet being, as above stated, in the neighbourhood of Teen-Tsin, and it was not till the 12th century of this era that it adopted its present embouchure to the Yellow Sea; that is, until the changes now spoken of occurred in its course; since which time the more inland part of its route has been in a continual state of change. The bed of the river at its mouth is so much above the sea-level as to prevent the ingress of the tidal wave.

In consequence of the constant increase to the bed of the river, owing to the perpetual transport of earthy matter from the west to the lower regions, the emptying of its waters has ever been a source of difficulty and inquietude to the Imperial Government, and the annual outlay from the Treasury, on this account, has been enormous. An extensive official staff has been maintained for the purpose of keeping the works on the bank in repair, under the direction of a special officer of high rank, called the Governor-General of the Yellow River, and many thousands of labourers were constantly employed in the endless repairs required. Since the outbreak of the present rebellion, however, the financial embarrassments of the Government have entailed a gradual reduction of this necessary expenditure, so that the allowance has been insufficient for the work to be done. The result has been that this unruly stream has broken through its neglected borders, and directed its unwelcome course into other channels, causing the devastation above spoken of. From the neglect of the river which has taken place for the past two or three years, some miles of bank are destroyed, so that the whole of the river flood in the upper regions passes out of its bed, and the small stream or remnant of the river at Tsing-Keang-poo comes from the influx of various trifling streams. I have thought it might interest the Fellows of the Royal Geographical Society to learn the great changes that have of late taken place in this well known river; and I know of no river in ancient or modern times where so large a stream has been so completely diverted from its course.

The last subject on which I shall offer a few remarks this evening, is the course of the Tai-ping rebellion through the centre of China. The movement commenced in 1849, in the province of Kwang-Se, where there were frequent conflicts between the imperial troops and the rebels for a year or two; the latter

hiding themselves when in difficulty among the fastnesses of the mountains in the centre of the province, and thus eluding all pursuit. But, as from their principles in this early stage of the movement they despised death, and, in fact, considered that to die in battle was a sure sign of their fitness for an entrance into heaven, they resisted the imperialists, and generally were victorious. This gave them confidence,—large numbers of disaffected people flocked to their standard, and they soon mustered a large army, burst from their concealment, and took several cities in various parts of the province. In April, 1852, they attacked Kwei-lin-foo, the capital city of the province, but did not succeed in taking it. Having raised the siege they went to the north, and entered the province of Hu-nan, taking cities on the way to obtain money and food.

In September, 1852, they reached Shang-sha, the capital of Hu-nan; but after besieging it for more than two months were unable to obtain possession of it, and continuing their northerly course arrived on the main channel of the Yang-tse-Keang in December. Passing down the stream in fleets of junks and boats, they successively stormed and took Han-yang, Han-Kow, and Wu-chang in January, 1853. At this last place the members of the family of Commissioner Seu, late Governor of Canton, were wholly destroyed, and his family tombs desecrated. It is said that, in retaliation for this, he and his successor Commissioner Yeh ordered the immediate execution of all rebels taken captive during the contest before Canton, two or three years ago. These Canton rebels were not of the Tai-ping party, being merely Triads; but Commissioner Yeh considered them all alike guilty of the extermination of the family of his friend.

By the capture of these three cities, enormous wealth fell into the hands of the triumphant rebels, who continued their passage down the river, taking one after another the cities of Kieu-keang, Ngan-king-fu, Wu-lu, Tai-ping-foo, and Nanking, the capital of Keang-Su, where they at once erected palaces for the several kings, established a Court and assumed a kind of imperial authority, issuing proclamations and mandates in all directions. They then took Chin-Keang, Yang-chow, and Kwa-chow, at the mouths of the Great Canal on both sides of the river. They destroyed the temples on Gold and Silver Island, and for some time set the imperial army at defiance. These latter cities were taken in February and March, 1853; and it was at Nanking that Sir George Bonham communicated with some of the leaders in April, 1853. Much wealth was now obtained by the rebels, and they immediately organized an army for the north, to move on Pekin and drive out the Manchos. This expedition started

about the end of 1853, from Yang-chow. Travelling by the Grand Canal from this point, they proceeded northward as quickly as they could, crossed the Yellow River, and advancing by the Canal, passed through Shang-tung and part of Che-le, and reached Tuh-lew, about 50 miles from Teen-Tsin. They remained at this and at other places in the neighbourhood for some months fighting with the imperialists; but after a long contest the rebels, having lost many of their adherents, had to fight their way south again, and after a year's struggle, the remainder of this army of 40,000 men being reduced to 5000, returned to Nanking. This was the greatest expedition that was undertaken after the capture of Nanking, and thus signally failed. The imperialists have lately taken Chin-Keang and Kwa-chow from the rebels, and appear to be hemming them in at Nankin. They still have a powerful force under one of their best leaders in the province of Keang-si; but it is very doubtful whether the rebellion will continue long if they lose their head-quarters at Nanking.

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NOTE by S. M. DRACH, Esq., F.R.G.S., on the Jewish Settlement at Kai-fung-fu.

In Delitzsch's work, 'Zur Geschichte der Jüdischen Poesie,' p. 58, Leipzig, 1836 (MS. English translation in Lib. Univ. Coll. London), there are interesting notices of their immigration, tabernacle-temple, and fifteen-line document, in Hebrew square characters, of a mixed Hebrew and Chinese dedication, &c. *Vide* Ignatius Kögler (*c.* Muir's journal, 'Zur Kunstgeschichte,' &c., part vii. 1779; 'Notitiæ quædam, circa SS. Biblia Jud.');

Trigaltius, *De Expeditione Christiana apud Sinas*, I. 118; Semedo, 'Relazione della China,' I. 193; Gozani, 'Lettres Edifiantes,' vii.; C. C. Taciti opera recognovit Gabriel Brotier, Paris, 1771, from Gozani, Domenge, and Ganbil's letters. These Jews immigrated from Si-yu, Land of the West, during the Tcheon 1122 (249 B.C.) and Han (205 B.C., 220 C.E.) dynasties. In 73 A.C., two years after Mingti's death, there were seventy families (sings); but in the last century only seven sings, 600 souls, when visited by Kögler. The rolls of the Old Testament were pronounced, *à la Chinoise*, *Julemeio-lung* for *Jeremiah*, &c. "They had no intercourse with their Si-yu (Western, Persian) brethren for 200 years." Over the Moses-pulpit they had the Chinese Emperor's name, *sur-mounted* with, "Hear, O Israel! the Lord is our God: the Lord is one. Blessed be the glory of His kingdom for ever and ever!" M. Drach, having read in 1852 or 1853 that two Chinese converts of the London Missionary Society at Sbanghae had been sent to Kai-fung-fu to purchase the stock of MSS. of the Old Testament; in May, 1854, was shown the exterior of one in the British Museum in London,—a folio volume, bound in vellum, and lettered, 'Bereshit' (Genesis). See also pamphlets published at Shanghai, in 1851, at the London Mission Press, entitled 'The Jews at Kai-fung-fu,' &c., in which an account is given of a visit paid to the Jews by two Chinese Christians, in 1850. The pamphlet contains much information on the present state of the colony, of the Temple and its services. Out of the original seventy families only seven have remained, numbering 200 individuals.

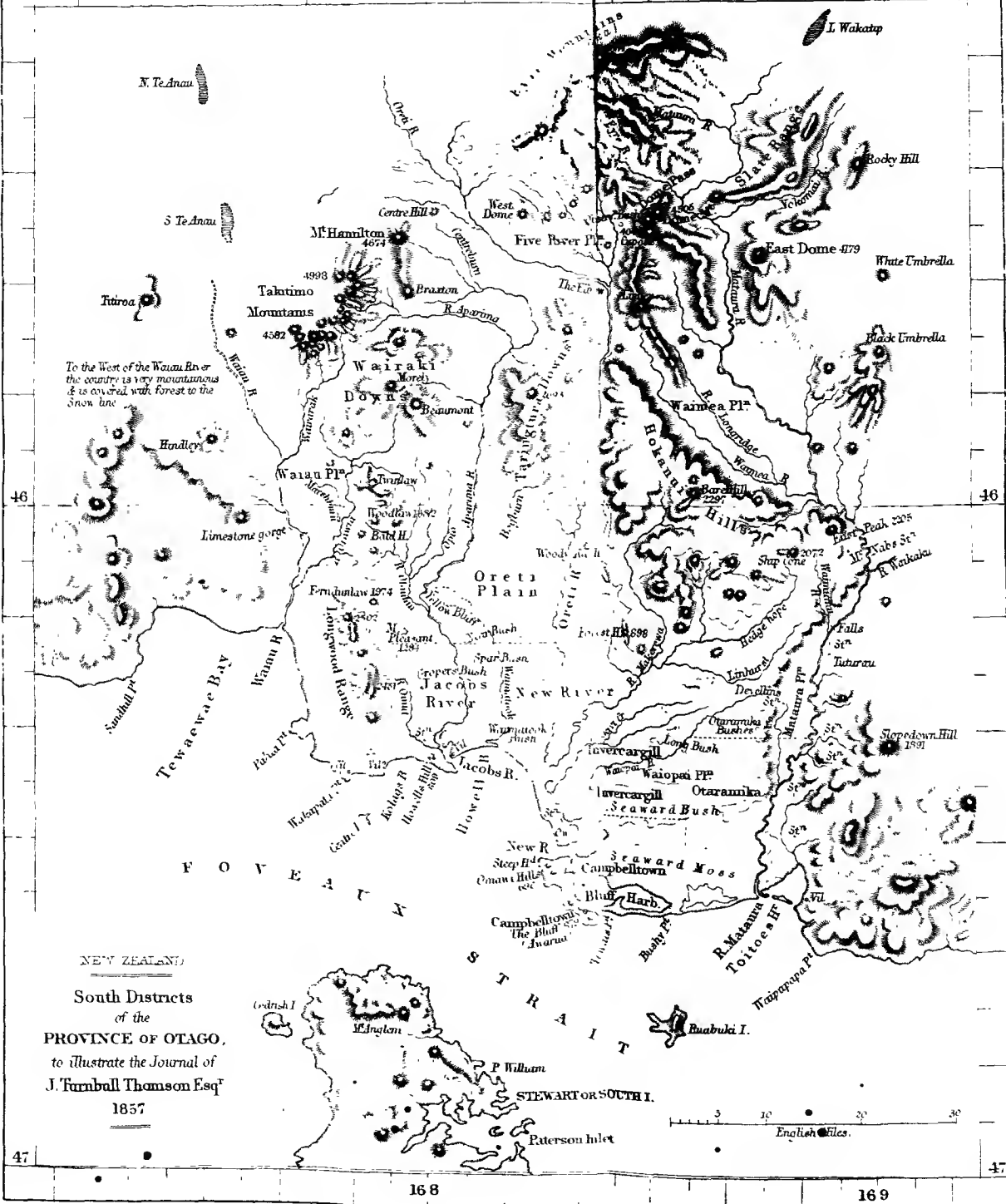
<i>Occidental Palestine Hebrew.</i>	<i>English.</i>	<i>Chinese-Hebrew.</i>
Bereshit.	Genesis.	Pieleschitze.
Tora.	Pentateuch.	Thaulaha, or King.
	<i>Supplementary Books.</i>	Sang-zo.
Schemuel.	Kings, imperfect.	Schemueul.
David.	David.	Tavite.
	<i>Ritual Books.</i>	Li-pai.
Isaiah.	Isaiah.	Iseha ha.
Jeremia.	Jeremiah.	Jalemeio-hung.
Dibre.	Ezekiel.	Tiveli.
	Daniel.	Caret.
	Joshua.	<i>Imperfect.</i>
	Judah.	
	Jonah.	Juonaha.
Jonah.		Micaha.
Micah.		Nahuang.
Nahum.	<i>Imperfect.</i>	Hapacuke.
Habakkuk.		Sefanejoha.
Zephaniah.		Hokavi.
Haggai?		Secalejo.
Zachariah.		Tiveli ha-jamiin.
Dibre Ha jamim.	Chronicles, imperfect.	Hafuchala.
Haphtura.	Prophet lessons.	Issetial.
Esther.	The Great Mother.	Issetha mama.
	Ezra.	
	Nehemiah.	
	Maccabees I., II.	Manthiiohum.
	<i>Commentaries.</i>	Kiang-tschang.
Bethel.	House of God.	Tien-tang.
	Holy to the Lord.	Kim-tien.

Chinese inscription-tables, anno 1444, 1515, 1663, 1642.

X.—*Extracts from a Journal kept during the performance of a Reconnoissance Survey of the Southern Districts of the Province of Otago, New Zealand.* By J. TURNBULL THOMSON, F.R.G.S., Chief Surveyor, Otago.

Read, May 10, 1858.

January, 1857.—We started from Dunedin on Tuesday the 6th of January, 1857, and arrived at Invercargill on Sunday the 11th of the same month. What with the difficulty in obtaining men and detention from bad weather, it was the 15th before we could make a commencement on the actual operations of the survey. On this day, accompanied by Drummond and Lindsay, I crossed the bar of the little creek that winds its course through the centre of the new town of Invercargill.





The boat which I had hired proved leaky and ill formed, so though the wind was strong and favourable we had not set sail above a minute before the mast fell overboard, carrying away the thwart and step. Having repaired damages we proceeded with better fortune, sailing down the broad estuary of the Waipai, and entering the narrow and intricate channel of the New River.

This river we ascended 7 or 8 miles, camping near Printz's at dusk. To the right of the New River is a sandy tract exposed to the fury of the westerly winds; to the left, on the contrary, is a fertile and woody district.

The New River finds its way into the sea near the Omawi or Steep Head, after meandering for many miles in the proximity of the sea-shore. The intervening sandhills evidently bank in the river from the ocean, and allow of no egress until the projecting land of Omawi Head is reached. Here a narrow but deep channel leads the water of the New River into the sea. This is facilitated by the protection afforded under the lee of the iron-bound promontory above mentioned.

On the 16th we were astir at  $\frac{1}{2}$  past 4 A.M., reaching the Tomoraken Creek at 8 A.M., where we breakfasted. The pull up the New River disclosed scenery much akin to what is viewed with admiration in the rivers of the tropics, regions exuberant of vegetation. Clumps of forest and grassy plains alternate. Where the forest holds sway the black and white pines are to be seen stretching out their ample arms, and the manuka, now in full bloom, forms a lively contrast to the sombre olive tints of the foliage of these and other native woods, while the native weeping willow contributes the charm of elegance by drooping its beautiful festoons towards the calm and mirror-like waters.

The forests here abound in singing birds; these, during the hours of early morning, by their songs, did not in a small measure contribute to the enjoyment of the scene. As we sped along flocks of aquatic birds were passed, which having yet scarcely made the acquaintance of man, were undisturbed by our near approach.

During the time we were discussing our breakfast under the shade of the forest a small bird about the size of the red robin of England, though not of his colour, came hopping about our fire, and approaching so close to us that we might almost have handled him. His colour on the breast was gray, on the wings and back it was black, his eye was jet. From his similarity of disposition to the robin of England he obtains that name here from the colonist.

As his motions were watched with some interest, his company was not unwelcome during breakfast. While he hopped about



picking up the stray crumbs, one of our party happened to whistle. This riveted his attention for a while, but he would soon unconcernedly hop about till another note was whistled, when again he would immediately fix his lustrous eye on the attractor. This was done several times, proving how great an influence such music had over him.

After breakfast we started with packs on our backs, passing through forests of pine, totara, manuka, and other native woods. On penetrating into the forest reminiscences of similar scenery traversed on similar duties in the tropical East returned forcibly to the memory. Though these forests are not so high as the forests of the tropics, yet they are equally compact, abounding in vines, creepers, orchideous plants, and ferns. The cabbage tree that here grows on the skirts of forests very much resembles the pandan, so often met with in analogous positions in the East Indies. We passed through two miles of forest before we emerged into the grassy plains. These plains, now unoccupied, may ere long yield abundant harvests to the industrious husbandman.

By noon we arrived at the cattle station of Mr. Macfarlane, and were welcomed in no moderate terms by his stockman, who informed us that he had had only the company of cows for these last three weeks, and possessing the gregarious instinct of mankind, he wearied much to hold converse with his species again. He employed himself during the afternoon in driving in some cows that he might regale us with new milk, and I was not sorry that this gave me for the first time an opportunity of viewing the evolutions of the stockman on horseback, and the wielding and the cracking of the huge stock whip. In the *home country* the cracking of whips is the amusement of children, but here it is an accomplishment of some importance. A whole herd of horned monsters tremble at the rifle-like sound of the stock-whip, and they fly pell-mell from its influence when driven in to be branded, or for slaughter. Our entertainer was skilful in the use of his instrument of authority. It deserves notice. The handle does not exceed 18 inches in length, but the lash extends to 15 or even 20 feet. In the hands of a tyro the instrument is of little avail, but the thundering sounds emitted from it by our stockman as he grasped the handle, in either hand alternately, proved how formidable a weapon it was in the hands of the initiated.

On the morning of the 17th I proceeded to Forest Hill, reaching it by noon, taking observations at intervals with the theodolite to fix the topographical features. The country passed through was generally covered with good grass, with this disadvantage, of being much intersected by swamps. The scenery for a country yet in the state of nature was as beautiful as could be desired, the combination of wood and savannah, hill and dale, contributed

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greatly to this end. We returned to the station by 6 P.M., pretty well fatigued by the roughness of the country. Swamps, which here abound, are the most tiresome of travel, and the unburnt tussack grass covering the plains brings one up at every step. To the east of Forest Hill the Makerewa River comes out of the hill district of the Hokanui, winding through spacious and grassy valleys. On our route to-day we crossed near to a herd of cattle, wild, owing to their being seldom visited by their owner. They gathered together in battle array, facing towards us, having a large bull in their van looking as angry as need be. He made a few issues forward, but dissipated our respect for him by turning tail and retreating ignominiously among the foremost of his charge.

Pine and ironwood were observed to be plentiful in the woods of Forest Hill, the former tall and straight, well adapted for spars.

On the morning of the 18th we were awake by the violent barking of the stockman's dog. The occasion of this was found to be the presenee of the tui, or parson bird. This feathered individual was seen perched on a tree elose by, uttering subdued notes, interluded by harsh and suppressed screams. To this soliloquy the dog was enunciating his violent objections, but our parson bird being beyond reach held on his discourse with much *nonchalance*. Altogether this bird is a most remarkable one: clothed in feathers of deep black from head to foot, he wears a most grave and sacerdotal aspect. This is not all: he bears out eloser the clerical resemblance by the possession of two pure white feathers under his chin, and the parody is complete when he commences to utter his guttural yet energetic notes. Sitting on the branch of a tree as a *pro tempore* pulpit, he wags his *paw* and shakes his head, bending to one side and then to another, as if he remarked to this one and to that one; and once and again with pent up vehemence, contracting his muscles and drawing himself together, his voice waxes loud in a manner to wake sleepers to their senses.

Last night being calm we were much troubled with mosquitoes of the grey type, and to-day myriads of blow-flies collected on every thing greasy. On looking at my blankets, which I had incautiously left exposed, I found to my disgust clusters of their larvæ upon them.

I may here add that this was the only occasion on which we were troubled with mosquitoes during our sojourn in the southern districts, and the nuisance of the blow-fly is easily guarded against by wrapping the articles they are given to blow upon in calico.

From Macfarlane Station we proceeded to the Oreti Settlement, at which we arrived in the morning of the 19th, after a hard pull against the current and rapids. After breakfasting on eel

and biscuit, accompanied by Drummond, I started for the Spar Bush, distant about 9 miles. I carried theodolite and bedding, he tent and provisions. We kept along the edge of the terrace, passing over a fine grassy country, but near the rivers Oreti and Waimatook, subject to be overflowed. The Spar Bush contains fine timber, but at too great a distance from water carriage to be available.

Our beef having got spoiled by the blow-flies, we carried four eels with us as a relish to our biscuit, requesting Lindsay to fish for more.

They were caught by a very simple method. A bit of salt beef was tied to a rude string made of stripes of flax leaves knotted together. After sundown this was thrown into the creek. The eels take hold of the beef and hold on till they are hauled ashore. This, it will be remarked, is a most primitive mode of obtaining a dinner of eel, but there is an improved mode, viz. by the eel-pot. This consists of a tube made of wicker work or bark, having a funnel-shaped mouth. In the interior is placed a bait of grilled flesh, worms, or even eels. As the funnel has its small orifice towards the interior, the eel easily obtains admittance, but he seeks to get out at all places but the right one. The eel pot is the invention of the Moaris, and they depend on it greatly for subsistence.

At the junction of the Oreti and Makerewa, Captain Stokes suggested the placing of a town,\* apparently being unaware that here the land for miles is at times covered several feet by floods. The settlers in the neighbourhood found out this to their loss, having had much of their property washed away; an experience the proofs of which could not have come under Captain Stokes's notice, owing to the unoccupied state of the country at the time of his visit. As the selection of the site for the capital of this part of New Zealand devolved on me, I may take this opportunity of stating that I decided, after being in possession of the requisite local knowledge not possible to be obtained by the above officer. An acquaintance with the interior, its topographical features and communications, as well as the completion of a careful survey of the rivers from their embouchures to the heads of their navigation, all combined to point out the head of the Waiopai navigation to be the position for the capital (now called Invercargill). At Invercargill the interior traffic can centre—to here the sea-borne traffic can be brought: it is consequently here that the interchange of merchandise must take place, and people congregate for that purpose. The site on the New River junction, besides being subject to floods, neither commands practicable outlets into the

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\* See 'Geo. Journal,' vol. xxi. p. 25.

country, nor water communication with the sea for vessels drawing above 5 feet.

On the 20th we started at 7 A.M., after breakfasting on biscuit and eel, and proceeded to the north end of the Spar Bush. The terrace land here bends suddenly to the westward, and a large plain of low land lies between this and the Taringtura Downs. Having broken my theodolite case, I was at some loss how to mend it, till Drummond suggested the gum of the flax. This plant being nowhere far distant was soon procured, and the requisite quantity of gum taken, which answered admirably. Flax and fern seem to have administered to the New Zealanders in their primitive state in the same measure as the cocoanut does to the natives of the islands and attals of Polynesia. Flax afforded their clothing, bedding, and fibrous material; fern afforded food.

On the afternoon of the 21st we arrived at the Bluff, after a rough passage down the New River against a heavy gale of wind. At Campbell Town, now laid out on the Bluff Peninsula, we found the people out of provisions, so no one would take us into their houses. As a last resource we got permission to sleep in the half-finished jail, and having procured with some difficulty a few pounds of wheat, we bruised it and supped. The principal object of my visit to Campbell Town was to obtain observations of the latitude, intending the Bluff summit as the southern station of the basis of the survey, the northern station being intended to be on some prominent object in the interior. On the 22nd the latitude of the Custom-house was found to be  $46^{\circ} 35' 58'' \cdot 8$  s., this being the mean of 18 circummeridional altitudes taken with an excellent sextant of Troughton; on the 23rd 16 observations gave the latitude to be  $46^{\circ} 35' 53'' \cdot 8$ : consequently the mean latitude of the Custom-house would be  $46^{\circ} 35' 56'' \cdot 3$ . The weather being hot, the sand-flies were rife, attacking every part of the skin exposed, and rendering the obtaining of a long series of observations a painful and teasing operation.

The bluff promontory on which Campbell Town now stands is called Awarua by the natives. The harbour of the Bluff, formerly much frequented as a whaling station, is protected to the westward by this promontory, and to the eastward a low tongue of shingle assists to nearly land-lock the anchorage. Being thus well enclosed on all sides, the Bluff harbour will be admitted to be one of the best in New Zealand, when it is stated that it has easy access, and no bar. Campbell Town, situated on such a harbour, will, doubtless, ultimately be of some importance, but at present there are only five buildings within its precincts, viz., a custom-house, jail, collector's house, and two cottages.

The promontory of the Bluff stretches from the estuary of the New River boldly out to sea, ending in a pretty steep eminence

facing to the south. The geological formation of the promontory consists of plutonic as well as aqueous rocks ranging from granite and gneiss to indurated and soft shales. The strike of the strata is generally north-west and south-east, the dip being perpendicular. The magnet is much affected in some parts, and remarkably so on the summit of the Bluff, as will be seen by the following observations :—

At summit, Mount Hamilton bore	..	..	340	10
„ 30 north of do. do.	..	..	356	40
„ 30 west of do. do.	..	..	342	00
„ 30 east of do. do.	..	..	300	20

showing a local disturbance of  $56^{\circ} 20'$  within the space of 60 feet. The stone in the vicinity abounds in iron ore, but I found no specimens sufficiently powerful to attract the magnet. On the plains I found the variation to be  $16^{\circ} 30' E$ .

The promontory of the Bluff is well wooded, in parts otherwise it is covered with an inferior grass, intermixed with fern and flax. Amongst the woods were observed the bright crimson tint given to the foliage by the flowering of the iron-wood tree. To the eastward of the Bluff harbour the land is low, and generally swampy.

From Campbell Town we returned to Invercargill, where I engaged a pack-horse at 3*l*. a week to accompany us into the interior with provisions. We proceeded in the further prosecution of the survey on the 29th, camping at the half-way bush at night; this is about 15 miles from the town. The country about here has generally inferior pasturage, but it is admirably interspersed with clumps of forest, and well adapted for agricultural settlement. The face of the country is slightly undulating, having a general rise to the Hokanui Hills, a picturesque group bounding the plains to the northward.

To-day I noticed on my path a Moari oven, and this may be taken as an opportunity of noticing these relics of bygone times. These ovens are seldom constructed by the Moaris of this part of New Zealand in these present times, they finding the metal-pot and kettle more convenient. The oven consists of a round hole dug in the ground about 4 or 5 feet in diameter, and of the same depth. Around the edges pebbles and stones are arranged. Their system of cooking in these ovens was the same as that so universal in Polynesia, and so often described by voyagers, so needs no remarks at my hands. But as monuments of the past these ovens form an interesting subject of discussion. They are met with in all parts of the plains in this district of New Zealand, and in places now long denuded of the forest. The ovens in best preservation are found near the edges of the bush, the more dilapidated are distant. It may be safely surmised that the

proximity of bush would be chosen for the easy procuring of fuel, and the relative preservation of the ovens would also lead to this conclusion. The existence of ovens would therefore indicate the spot where forest had been, and when found far from this would tend to prove its gradual retrogression and diminution on the face of the country. Indeed the gradual extirpation of the forest may be noticed on that existing, and the process is a simple and natural one.

The edges of the forest are choked with dry scrub grasses and ferns, which, on being set fire to, burn vigorously, destroying to various depths a fringe of the adjacent trees. Grass takes the place of the burnt scrub, and scrub takes the place of the burnt forest: thus the forest is diminished at each burning of the fringing scrub, grasses, and fern. The native grasses grow up sufficiently dense to burn vigorously once in three years: thus, where man existed, it is not an improbable hypothesis that fires would rage over the country, whether propagated by accident or design, at intervals not much greater than every three years.

If it be admitted that the Moari ovens were always placed near bush, they then stand as proofs of the former wooded state of the country, they being so universally distributed over it; and the rate at which the forest diminishes at each burning might, with the other data above alluded to, lead to a rude calculation as to the date of the construction of the ovens by simply measuring their distances from the adjacent woods, consequently the period of their use by the aborigines. Presuming on the supposition that these ovens were always in use by the aborigines, we might then have some grounds for speculation on the comparative age of their occupation of these districts. It is true that speculations founded on such rude data would involve the adoption of too wide a margin for founding satisfactory conclusions thereon, yet with all these deficiencies a date might be suggested, and I believe that it would be a recent one, the first coming of the Moari.

While engaged on this subject it must not be lost sight of, that, though the forest is generally observed to diminish pretty regularly, this is not always the case; for it diminishes more rapidly on one soil than on another, and I have even seen proofs of thousands of acres having been destroyed at one conflagration. I have also often remarked that when ovens are seen 10 to 20 miles away from forest, investigation has shown that a clump of wood had at a recent date existed in their vicinity, the only remnants of which would be in a scorched log or two prostrate on the ground.

The remnants of these ovens may be truly said to be the only monuments of the past that we owe to the aborigines; Nature has left another class of monuments on the face of the plains; these

consist of numerous mounds of earth covered with pebbles. These mounds seldom exceed 2 or 3 feet in height, and invariably have a hollow on one side a foot or 18 inches in depth. These are indeed pigmy structures when compared with the stupendous works of man in the Old World, but, small as they are, they form too prominent a feature in a country yet in the state of nature not to attract the attention of the traveller, so their local interest is not dispicable.

These mounds—and they are very numerous—were an enigma to me for some time till I had viewed all parts of the country, after which a simple solution presented itself as to their origin. They are undoubtedly formed by the falling of trees of the forest, whose roots, on turning up, raise the attached earth with them. When the tree decays, the earth falls down in a heap bordering the hollow out of which the heap was raised: thus we have the mound and the hollow. On the mounds will invariably be seen such stones and pebbles as had been raised with the soil, and they, for the most part, remain on the top, owing to the washing away of the more transportable sand and earth during rains with which they are mixed. The plains in the vicinity of the Hakanuis, and many other parts of the province, abound in rounded quartz pebbles, deposited close to the surface; where this obtains, the tops of the mounds will be seen covered with these, presenting too remarkable a feature in the primeval scenery not to draw forth the surmises of the observer. But these mounds are not all covered with quartz pebbles: thus on the Oreti and Aparima plains, where no quartz exists, the mounds are seen to be covered by pebbles, the *débris* of other rocks.

I have observed these mounds in all shapes of construction, equally attached to the roots of the newly fallen tree, to the half decayed, and to the nearly obliterated one. On all these mounds would be seen the stones and pebbles pertaining to the formation of the district. Thus we account for the prominent collections of pebbles on the mounds, and this leads us to the feature that has attracted even more attention, *viz.*, the numerous collections of white pebbles which are found in certain districts. The fact of being white has no doubt attracted attention to the heaps which would have passed unobserved had they been coloured: nevertheless the latter are as numerous as the former in their proper districts. Thus, as I remarked before in the Oreti and Aparima plains, where no quartz is to be discovered on the mounds, little collections of more sombre coloured pebbles are seen occupying their place. But even where quartz pebbles abound, it is frequently observed that coloured ones are intermingled.

The collections of white pebbles, varying as they do from a wheelbarrow to a handful, have been suggested, by a facetious and

clever savant in the neighbouring province, to be relics of the crop of the moa; others with greater appearance of probability have suggested that these heaps had been collected by the Moaris to heat, for the purpose of cooking small birds: without bringing either birds or men to our aid, natural causes may be suggested as to the origin of them, viz. the action of the atmosphere on many of the detached pieces of quartz so abundantly scattered over the surface. Sudden alternations from frost to heat would tend to split them up, and time would round the fragments; or the gusts in storms, which, expending their fury on the mounds, already mentioned as being covered with pebbles, taking up and carrying off in eddies little collections from the many exposed, and depositing them in the scattered collections as we find them.

The above subject of pebble collections may appear puerile to many who have not traversed a country yet in the state of nature; it will not readily come home to them that these little but numerous objects appear to the traveller in the garb of importance. I have often heard the subject discussed with warmth and energy by the colonists at their social meetings, and consequently in devoting a few sentences to the subject, I believe I need scarcely offer an apology.

*February, 1857.*—Up to the 1st of February I was employed traversing the Waiopai plains. I found that the Makerewa River collected all its waters from the Hakanui hills. These hills have a most picturesque appearance, being much broken and variegated by rocky and bare tops, wooded slopes, and grassy valleys. The ample and well watered glades, now desolate, invite the occupation of man. On many parts of the plain I observed prostrate trees, proving a very recent occupation by the forest. The hills were covered with quartz pebbles; some schistose rock was also observed, uncommonly like petrified wood.

The 1st and 2nd found us at the Otaramika bushes: here the scrub caught fire near our tent, and we saved our property with the greatest difficulty. A wood hen was shot: it is a bird between the size of a partridge and a pheasant, and with plumage like the latter. Its wings are too small to enable it to fly, but it is supported on stout legs, by which it progresses very rapidly on the ground. Its wings are armed with horny spurs, which it uses in attack and defence. It frequents the brushwood surrounding the forest, and threads the mazes with the greatest facility.

On the 3rd we proceeded to Mr. Devellin's station, situated on the Mataura plains. The grasses on these plains are superior, but much overrun with spear grass, an indication of good soil. The plains above each terrace have a magnificent expanse; and well might their pasturage have excited the cupidity of the sheep stealer, Mackenzie, who selected these plains for depasturing the



sheep he attempted to carry off from Canterbury province. Remnants of his hut are still to be seen in Mr. Devellin's bush, together with a small crop of potatoes. These had been prepared for his expected arrival through the lake district, by a track not yet traversed by the white man.

From the 5th to the 8th stormy weather detained us at Mr. Devellin's station. Drummond, in searching about the hut of Mackenzie, found in its proximity a saw, 2 reaping hooks, an adze, marked J. C., an American axe, and a trace chain. After Mackenzie's apprehension, the Moaris of Tuturau are said to have removed many of the articles, principally consisting of cooking utensils. When Mr. Devellin first visited the place, he saw pannikins, plates, &c., sufficient for 4 men. It is evident from this that Mackenzie must have had sharers in his enterprise.

On the 9th we started at 8 A.M., and kept along the edges of the high terrace until we reached the Waimumu, a stream coming out of the Hokanuis, and falling into the Mataura, 2 miles above Tuturau. This stream we reached by 3 P.M., when we rested an hour. North of the Waimumu the high terrace breaks into numerous long valleys, so as no longer to bear the character of a terrace, and the watershed is close to the Waimumu. We arrived at Mr. MacNab's shearing hut at 7 P.M., and camped for the night. This has been a fine sunshiny day, and the country passed has generally borne good grass, though rather coarse. The scenery is magnificent; the broad plains and terraces stretching away to the south, and the bold configuration of the Hokanuis to the north. The Ship Cone, which here has a pyramidal form, from its base to its peak, in height not less than 2000 feet, forms a grand and impressive object in the panorama. The Hokanui Hills are timbered half way up their southern sides.

The Mataura flows close under the eastern range of hills, which are merely a continuation of the Hokanuis, though here the junction is broken. These eastern ranges continue in almost a straight line to the nuggets on the eastern coast, near the mouth of the river Clutha.

Before leaving this part of the country, a few remarks may be entered upon regarding that remarkable feature, the plains and terraces of the Mataura. The terraces are three in number: one next to the river; a middle one, having a rise of about 50 feet; and a third, having another rise, varying from 70 to 200 feet. The plains which they enclose extend 24 miles in length, and 6 miles in breadth. Similar plains and terraces are observed on many of the southern rivers, more particularly the Waiau, where they even take the appearance of grandeur. Terraces are also observed farther up the Mataura, nearly at its sources in the Eyre mountains. The mode of action that produced these re-

markable features can only be surmised in our present confined knowledge of geological formation. Two theories may be suggested: 1st, the deteriorating effects of the waters of the river, which in ages would alter its course from side to side, and carry away the soil from the containing banks, thus forming the sudden and steep edges of the terraces; and 2nd, the unequal settlement of the Waiopai and Mataura plains, which, at one time, might have been on one level. Had the valley of the Mataura been an arm of the sea, the wearing away of the terrace edges might have been easily accounted for; but the absence of shells and other marine productions would prove that no action had taken place by this means, and to the action of the waters of the river I am inclined to ascribe little power in effecting the enormous escarpment of so great an extent of country. The second mode suggested appears to me to bear the greater appearance of feasibility, but, as hinted before, it would be improper to assume the correctness of the same; were it so, the terrace edges I would take to be the line of fault, and the extent of dislocation of strata would here be found to be equal to the rise of the terrace.

Situated 2 miles above Tutarau are the falls of the Mataura. Here the river falls over a bed of limestone about 20 feet high, presenting, when the river is flooded, a spectacle of considerable grandeur. The river has cut its way through the bed of limestone for upwards of a mile, and had history afforded us such proofs of deterioration in the rock as Lyell has collected regarding that over which Niagara falls, we would have had data for calculating the time taken in cutting the rock so far. Now would be the time to place such marks as would be a guide to future observers.

Near the falls are beds of coal or lignite, accompanied by beds of shale, containing fossil ferns in abundance.

Judging from the sections brought to light by the steep banks of the Mataura and Makerewa, as well as a few land slips on the Waiopai plains, these plains may be noted to be of aqueous formation. The strata abound near the surface with beds of rounded quartz pebbles and shingle of other descriptions of rock, while underneath are shales and blue clay. The plains have a moderate rise towards the Hokanui Hills, which bound them to the north, and here the formation alters. While the strata on the plains are generally level or slightly inclined, the strata here are much disturbed and tilted. On the ridges of the higher hills they generally are nearly perpendicular—having a north-west and south-east strike. I did not observe here any of the true igneous or plutonic rock. The most prominent rocks were altered by the action of heat or galvanic currents, taking the appearance of trap, trap-tuff, and chert. Breccias, shales, and softer strata are found

in the less prominent ridges. Quartz shingle was everywhere abundant on the surface of the plains to the south of the Hōkanuis.

The 12th found us on the Waimea Plains, with a morning of drizzling rain and mist. We started notwithstanding, and kept on till 2 P.M., when we camped on the banks of the Matura, near the gorge of the mountains. It cleared up at 5 P.M. and turned out a beautiful evening. The country passed over bears superior grass, but is much overrun with scrub. We are now under the foot of the Snow Mountains, and the scenery is impressive, with the rugged, barren, and steep heights, casting their sombre shadows over the plain. The Matura here is a beautiful pebbly stream, pure as crystal. The valleys of the mountains have generally accessible timber. We shot several ducks, and had a feast, for we had been living on bread and tea alone for several days.

On the 13th we were at Mr. MacKellar's station, where there are the remnants of a Moari settlement, called Tomogalak. Moa bones are found here in abundance, some measuring 2 inches in diameter. It is supposed that these bones are collections thrown away by the Moaris after the bird had been eaten. Many of the bones do not appear above 30 years old; indeed I was informed by an old native at Jacob River that he and his tribe feasted on the moa in his younger years.

The 14th found us camped on the banks of the Oreti, near the Elbow. The country here bears fine grass, but much overrun with a scrub called Tomataguru by the natives, or *Wild Irishman* by the colonists. It is full of prickles and is difficult to penetrate. The formation is chert with gritty shales.

As we have gradually lost plates, knives, and forks, we are now existing in the manner of savages, boiling our flesh or fowl in our tea-can (called a *billy*), kneading our dough in waterproof cloaks, and baking our bread in the embers of our camp-fire. Our table is the grass, and our plates a few leaves, our seats a stone or log of wood. Our beds are of course on the ground, softened with a few bunches of fern or grass, covered with oiled calico to keep off the damp. Our principal subsistence has been "damper" (species of bread) and tea. The want of flesh brings the greater zest when we can get it. Wet as we often are all day, and bedded as we often are on the damp ground all night, we have thriven amazingly. The best of all blessings, good health, has attended us. There is something exhilarating in daily coming on new country, and in descrying new objects of interest. We are now beyond the range of the white man, and the country is utterly desolate of inhabitants, the aborigines having long ago given up their traffic with the interior. The country is now becoming more

interesting, as we are in the midst of high and picturesque mountains having level and fertile plains, and valleys at their feet. There is also a great extent of forest to the north, on the slopes of the Eyre Mountains. A valley leads north, low and easy to look at; will this lead into the interior?

On the 15th we proceeded to the foot of the Dome mountain, and camped at the spot eligible for astronomical observations. A new plant appeared here, allied to the cactus, and colonially termed a "*Spaniard*." It has stout blades with sharp points—no agreeable objects to encounter. The country here is much overrun with these and "*wild Irishmen*;" so much so that it was a matter of some difficulty to drag our horses through them, for the poor animals, in swerving from the talons of the "*wild Irishmen*," were apt to be received on the more deadly weapons of the "*Spaniards*."

On the 16th I started at 7 A.M., with Lindsay, for the tops of the Dome and Cupola, reaching the summit of the latter by 10 A.M., and of the former by noon. The Dome is 4505 feet above the level of the sea, and the Cupola 4045 feet. They command a most extensive prospect from the eastern to the south-western coasts, and over the plains intervening. Water froze on each summit while we were taking the observations, although the day in the plains was a warm one. Near the summit the vegetation consisted of snow grass, mosses, and a species of heather. Half-way up the mountains some pretty flowers were gathered, amongst which the mountain daisy deserves notice for its elegance and simplicity of form, and beauty of colour. A ground berry, called the New Zealand strawberry by the colonists, formed an agreeable but rather insipid repast to our parched lips. It tastes much like the rose apple of India. While on the Dome, Lindsay employed himself in scratching our names and immortalizing them under a cairn which he built during the time I was busy with the theodolite.

The formation of these mountains I would term metamorphic, consisting as they do of cherts, and allied compact rocks, hardened by the action of heat. The plains beneath are aqueous, consisting of the transported débris of the interior, and adjacent mountains. To the N.N.E. an opening appeared through which no high land was visible: I conjectured this then to be the pass into the Central districts, at present entirely unknown to the European, and but vaguely described by the Moari.

The heads of the Mataura were seen to come out of the Eyre mountains, winding between the Dome and East Dome through a deep gorge, by which it issues on the Waimea plains.

The panorama of the Dome mountain is truly grand, presenting to view as it does the snow-clad and serrated outline of the

Eyre mountains, the extensive plains of Waiopai, Mataura, Waiau, Clutha, and Waimea; also Molyneux Bay, Tewaiwais Bay, Solander Island, and the boundless Southern Ocean. We got back to camp by 5 P.M. pretty well tired with our day's exertions.

We remained at our camp in Observation Bush till noon of the 18th, having during the interval ascertained the latitude by circum-meridional observations of the sun.

			°	'	"
The mean of 5 observations gave the lat. as	..	45	34	51	
The mean of 3	..				45.6
<hr/>					
Mean lat. of Observation Bush	..	..	45	34	48.3 s.

The uncertain state of the weather prevented more observations being taken.

From Observation Bush we struck for the north end of Taringtura Downs, crossing the Oreti River. To the left we observed thousands of acres of dead forest apparently destroyed at one burning. Dusk found us entangled in a swamp, with both our horses bogged. By unloading we made shift to extricate them, and we camped on the edge after dark during a heavy gale of wind. Here the country being destitute of wood we could obtain no tent poles, so as a substitute we used the gun and theodolite stand, and thus managed partially to exclude wind and rain. The whole of the Oreti valley consisted of recent deposit of shingle, and the grass is soft and good.

We were astir early on the morning of the 19th, holding along the east banks of the Aparima: when we came to the gorge we struck down to the bed of the river to avoid the rough and hilly country on the east, and we camped at 6 P.M. on the west side. The pasturage of the country is superior. The formation of the hills as far as could be examined was metamorphic, the strata being perpendicular, and strike N.W. and S.E. The bed of the Aparima showed the débris of plutonic rocks, such as porphyry, greenstone, granite, and amygdaloids. This fact would indicate that the Takitimo mountains, out of which the Aparima flows, are formed of these. Near our camp the impression of a bivalve was found in a stone of compact texture, but I could not find any rocks in the vicinity of the same nature. We washed the sands of the river and examined the "*pockets*" of the rocks for gold, but found none. The formations do not indicate its existence in this valley.

Our provisions being nearly expended we were astir at 4 A.M. of the 20th, and held down the bed of the Aparima, crossing and recrossing 100 times, till at length at 6 P.M. we arrived at the Yellow Bluff, where we camped for the night. The grasses on

either side of the river were rank, but of excellent quality for grazing. The plains are alluvial and shingly. The river when flooded seems to spread over a considerable distance from its banks. As we have descended from the interior, the Aneroid barometer which I carried has notably marked the change of atmospheric pressure. There is fully one inch difference between Mackellar Station and the sea level.

With our long travel over shingle, our horses are knocked up, and Drummond is in boots without soles, and all our trousers are torn to rags. Lindsay shot a duck, which was a great relish to our sugarless tea. The formation at the Yellow Bluff consists of strata of rolled pebbles of granite, porphyry, chert, &c.

On the 21st we proceeded to Howell's Home Station, keeping along the edge of the terrace. The grasses here are generally inferior excepting to the eastward of Near Bush, where limestone containing fossil shells crops out. The 22nd found us at Jacob River Settlement, where we remained till the 26th, preparing for another month's travel into the interior by laying in provisions, purchasing clothes, shoes, &c.

Jacob River Settlement (so named from a Moari called Jacob, who resided on a patch of cultivation now called Jacob Garden, situated two miles from the mouth of the river) deserves some notice. It formed one of the many whaling stations that formerly studded the coast of New Zealand, and is now the only place (as far as I am aware) in New Zealand whose inhabitants yet continue the occupation. About 20 to 30 years ago, at which time whaling was carried on with great success, the merchants of Sydney and Hobart Town sent their vessels to these coasts during the season that the whale was known to frequent them. Owing to the savage and warlike propensities of the Moaris of that period, the whales did not much trust themselves amongst the native settlements, but sought such positions as were not easily accessible, to guard against surprise.

Codfish Island, situated to the west of Stewart Island, being girt by steep rocks constantly washed by the heavy roll of the stormy Southern Ocean, and having only a small boat-landing, was early chosen as a favourable site both for the operations of whaling and sealing, which latter also formed a profitable branch of industry, as well as for security against the treachery of the savage tribes then inhabiting Centre Island and Ruabuki. The natives of this part of New Zealand were formerly comparatively numerous, exceeding 3000 to 4000. Numerous and savage as they were, they were yet kept in awe of the more powerful tribes to the northward, who occasionally made raids on them, killing and devouring or making slaves of all who fell into their hands. It was in consequence of these warlike excursions that the natives of this part

of New Zealand inhabited the islands above mentioned under the same motives as actuated their European visitors, and the mainland was only occasionally stealthily visited by them in the pursuit of the wood-hen, quail, eels, and other animal food.

The Europeans of Codfish Island numbered over 100 souls, and as, on the arrival of their ships, they held stores of the much-coveted articles, tobacco and rum, they possessed the means of securing the neighbouring chiefs and tribes to their interests. The consequence was that their intercourse became as intimate as the Europeans desired; and considering the fact, that even the chiefs of those days held it an honour to sacrifice the charms of their daughters to the white man, it will be correctly surmised that a mixed race grew up as years rolled on.

As the intercourse of the white man and the Moari became more intimate, so did their knowledge of and confidence in each other increase. This led to mutual support against the fear of other tribes which led to bolder views and more extended operations on the coasts. Thus it was not long ere the solitary stronghold of Codfish Island became of very secondary importance to the many other settlements formed along the coasts, such as at the Bluff, New River, Wai Kawa, Jantuck, Jacob River, &c., all of which, during the first and last days of whaling enterprise, became stations, and were continued as such till the fish was nearly extirpated in these waters.

From these stirring times of whaling, so often conned over by the "old hand" as he smokes his pipe at the door of his hut, the native race has declined rapidly in numbers. One cause of decline is said to have been the measles which broke out amongst them some years ago, and swept away two-thirds of them in a short time. To this visitation and other imported diseases may be attributed much of the decline of the native race. Lung diseases are also fatal to great numbers of them.

The natives of the present day are so much reduced in number that they do not exceed 400. The principal remnant reside at Ruabuki Island, Centre Island being now deserted. On Ruabuki Island an enterprising and devoted missionary resides, who leaves all the world to follow in this lonely spot his sacred calling. A few dozen natives are scattered about the coast settlements, such as at Jacob River, New River, and the Matura. There are a few also residing on Stewart Island.

The busy days of whaling did not last many years. The fish was nearly exterminated, and the residue, from being disturbed, deserted the coast, so where dozens at one time could be seen in a bay none made their appearance. Such Europeans as had not contracted ties binding them to the soil left for other scenes; such as had ties contented themselves with eking out

a dull existence, subsisting by the labours of their Moari help-mates, who cultivated corn and potatoes for their white lord and master. The occasional call of an American or Australian whaler would furnish clothes, tobacco, and rum, in exchange for potatoes and fresh pork, of which there was always superabundance in these settlements.

Excepting at Jacob River such was the condition of the Europeans and their settlements till within these last two years, when the purchase of the country from the Aborigines opened it to colonization. From hence a new era of activity commences, but on this we will not now enter, but return to Jacob River. This settlement is much indebted to Mr. Howell for its present prosperity, for notwithstanding the failure of the principal means of occupation of the inhabitants in sealing and whaling, he remained by his adopted country, fostering by his energy and enterprise such branches of industry as were available either by land or by sea. While he annually fitted out whaling expeditions to the West Coast, he, at the same time, introduced stock to the country from Australia. On my late visits to Jacob River, more proofs of comfort and plenty were to be noticed than in any other part of the province out of Dunedin, the capital. The inhabitants, both Native and European, possess abundant supplies of wheat and potatoes grown by themselves. The meaner sort have plenty of pork in their enclosures, and fish for the trouble of catching them, while the wealthier possess large herds of cattle, and flocks of sheep feeding on the extensive pastures surrounding the village.

While possessing a climate greatly more genial and temperate than the Shetlands, if we may judge by the historical novels of Sir Walter Scott, we cannot but pursue a parallel between the olden times of those North British Isles and the present of Jacob River. The pursuits of the inhabitants appear to have been similar and their social condition identical. Thus the Shetlands, before the age of steam, were relatively as far from the capital of the kingdom as South New Zealand may be reckoned now. Placed in so remote a position, the inhabitants of the latter were left much to their own resources: thus they made shift to manufacture soap, to tan leather, and distil spirits, all from native productions. But if the vessels return successful from their whaling expeditions, they bring with them some of the luxuries and rarities of civilization, amongst which, sugar, tea, rum, and musical boxes are the most appreciated. Occasionally an American whaler will, here, like the Dutch yawl of yore in Shetland, lie to off port, making quick traffic in things contraband and uncontraband, in exchange for potatoes and fresh meat.

So much are the inhabitants attached to free trade, that on an exciseman being seen in the village, all the houses were shut,



locked, and harred. This happened for the first time during my visit, so I was a witness to the desolation of the streets or rather paths on the occasion. Lonely as these settlements in South New Zealand are, news flies rapidly from one to the other. It is soon known that the *Otaga* has run into New River, and discharged her cattle, and, probably, more prized articles; that an American whaler is lying in Paterson Inlet with good tobacco at cheap rates; that the *Eliza* has taken three whales and lost one, one boat smashed but no lives lost; that the sealing expedition to Dusky Bay had been unsuccessful, the boat being capsized in a north-wester and four hands drowned. On the entry and departure of the home vessels, where many friends are on board, the whole village turns out, from the child to the patriarch, to welcome or bid farewell.

An occasional, but now very rare excitement, engages the attention of the villagers: a whale is seen blowing in Howell Roads. The boats, with their harpoons, lances, and lines, are equipped in a jiffy. They pull out and approach the sea monster. The harpoon is launched with unerring aim into the quivering flesh, and the animal disappears. In due time it comes to the surface to blow, when the lance executes its office, grasped by a bold and firm hand. Cries of triumph soon relate the successful capture, and the monster is towed into the waters of the Aparima to be cut up for the "trying pans."

To continue the parallel that I have attempted to describe, there would not be much difficulty in pointing out the Old Udaller, tough as an uncut diamond, sensitive as the aspen leaf, whose board is spread with abundance in the common hall where high and low sit together to partake. Nor can we detect here a word or motion to offend an entertainer or stranger's pride. Such courtesy and kindness as warm the heart of the wearied are afforded duly by each in their station. Here the amenities that adorn the intercourse of polished society may be a-wanting, yet there is not the grovelling demeanour of the hard-worked and ill-requited labouring man to encounter. Here the position of the labourer is superior, his labour is not dishonoured, and he, consequently, respects himself and others.

To finish my parallel, last not least, Jacob River is not without its Minnas and Brendas to grace the social circle.

The Europeans and Natives, as said before, live in great abundance, nor to attain this is much exertion required; indeed, excepting at planting and reaping their time is their own. To the close and constant labour entailed on the natives of civilized countries they are strangers; it is only on the more exciting employments at which they will be induced to expend their energies, such as whaling, fishing, and mutton-bird catching. With these

they occasionally fill up their spare time. The Moaris delight in good horses, and here they have ample scope in the sport of horse-racing on the splendid 25-miles beach stretching to New River.

As I have for the first time mentioned the mutton bird, I may take this opportunity of saying something regarding it. It is a sea-bird that frequents the small islands adjacent to Stewart's Island, and its flesh is much prized by the natives for food. The season for procuring the bird is March and April. It is only the young that are taken, and these are either procured by digging them out of the holes in which they are fostered by the hen, or they are collected by dogs during the night, at which time the hen entices its young out to the sea-shore. When the young bird is caught it is so excessively fat, that my informant, in his own words, tells me, "they are like bladders full of fat." While the collection of the bird is going on, the process of *trying* out the fat is continued in pots or cauldrons carried to the islands on purpose. There are two ways of preserving the meat, one by packing the same in kelp bags, filled with the fat of the bird, and the other by salting down. The preservation in kelp bags is a most effectual one. These bags are found on a species of seaweed obtained on the rocks on the coast, and measure about 14 inches square, proving a tight and trustworthy receptacle. To Europeans, generally, the flesh appears rank and over rich, but it is much esteemed by the natives and "old hands."

The Moaris of Jacob River and adjacent settlements have adopted, for the most part, the English costume; garments made of flax are rarely seen, and when worn are only adhered to by some of the elders, probably under the feeling of honouring ancient practice and disapproving of innovations.

The houses of the Moaris are entirely constructed in the manner of European cottages; the walls being of planks, and roof of thatch or shingle: the chimney stands at one end, is coated inside with clay, and possesses ample space on three sides of it for seats or benches. When in their houses, they squat on the floor during daylight; and there being only one apartment, at night modesty owes to darkness only what little respect it may obtain. The torment of the Moari house is the flea, and I have often pitched tent in the wet rather than encounter the infliction of the myriads that fasten on you in their domiciles.

The Christian religion is professed by nearly all, though it may be correctly surmised that much of the influence of their former superstitions yet holds sway.

In the denizens of Jacob River the west coast of Middle Island is a fertile source of interest, as it is here that they find occupation in whaling or sealing. This coast is the most remote in New Zealand, but it is thoroughly known to them, as it was

much frequented by them and the Europeans of Codfish Island in open boats on sealing expeditions from the origin of their settlements. This part of New Zealand is much subject to westerly gales and heavy rains, so is no agreeable field of industry. Notwithstanding the variable and stormy nature of the region, it was frequented with perfect safety by the experienced, for sounds and promontories alternate in such close succession that harbours of refuge are always close at hand.

One curious feature of these sounds is in their great depth and bold shores ; in most cases anchorage is difficult to be found, and when not found vessels moor to the trees. For though it be blowing a gale overhead, the steep cliffs so protect the waters that not a breath is felt on the surface. Mr. Bates, my guide, informs me that copper ore abounds on the west coast, and also coal. The greenstone, so much prized by the Northern Moaris, is also met with. This mineral is said to have a market in China. Mr. Bates also informs me, that a bird, called by the "old hands" the "Emu" (*Apteryx*), exists in the woods. It is about 18 inches high, and resembles the Australian bird of that name.

It was to the south-west coast of Middle Island that Cook, the celebrated navigator, made lengthened visits, and it might be expected that remnants of his stay should yet be found ; but I learned nothing of these from any of the "old hands" that I questioned on the subject. At Thompson Sound the proofs of a mysterious and fatal event still exist in the remains of a sunken Indiaman. The vessel lies far up the sound, at a spot where her destruction could not have taken place but by design. The ship is said to have been manned principally by Lascars, whom the captain and Europeans landed on an islet, and, leaving the miserable creatures to their fate, they proceeded in the boats to Sydney. The Lascars died of starvation, and their bones are yet to be seen blanching in the sun, strewed in all directions.

In these remote regions how many may have been the cries of agony and despair emitted in vain !—even the few hardy Europeans of Codfish Island, when occupied in their adventurous enterprises—how often were met their experiences of hardships from shipwreck, starvation, and cruelties, by the cannibal tribes that surrounded them ! Of these times the "old hands" have many a heart-rending tale to relate ; but they relate them without deigning to expect your sympathy—hard lives and rough usage, surfeits in plenty and starvation in poverty, have blunted or effaced all relics of what civilization calls "feelings."

To return to Jacob River Settlement. Corn ripens by the end of February, and is generally cut by the middle of March. The crops, when I saw them, presented a luxuriant appearance, and many of the wheat plots promised to yield 50 to 60 bushels an

acre. The potato crops are always excellent. These crops are easily raised and secured; but wheat is said during some seasons to be got in with some difficulty, owing to the wet. This difficulty I have no hesitation in saying is owing to the want of proper means and appliances. I am informed by a practical agriculturist that in such a climate no fear for the scarcity of the crops need be entertained, if improved methods of farming be resorted to. In a plot of white wheat I counted the grains in an average head, and found them to be 40 in number: some heads bore 70 grains.

On the morning of the 26th, having got our provisions and pack-horses ready, we started, taking Mr. Bates, a settler at Jacob River, to assist in bringing up the extra provisions now required for a lengthened absence. We proceeded as far as Groper Bush, where we remained to examine the country in the neighbourhood. This part bears pasturage of good quality. The formation is aqueous, and limestone, containing fossil shells, crops out to the north of Groper Bush. Bates informs me that one of his native cousins saw the feathers and track of the moa about six years ago amongst the woods west of Jacob River; but he was afraid to follow the bird.

On the banks of the Ormut River some most beautiful sites for farms exist. To the west the woody ranges lie clothed with luxuriant forests of birch; to the east undulating prairies, covered with grass. One or two positions have all the requisites of a baronial demesne.

Bates tells me that the remnants of wild Moaris were found by him some years ago on the west coast. These consisted of heaps of skeletons in a cave, fish-hooks made of bone, and clothing made of flax. There have been occasional suspicions of wild Moaris being about; but he never met with any during his 20 years' residence, during which long period much of his time was spent on the west coast.\*

*March, 1857.*—The 2nd of March found us camped under the north-west side of Twinlaw; the hills running from thence to Longwood Range. All, as far as examined, showed rocks of metamorphic structure; but the western and northern bases showed limestone cropping out. Since we have left the region of the Hokanuis we have observed no more collections of rounded quartz pebbles. The little hillocks caused by the downfall of trees are here either covered with bare clay or pebbles, and stones of sandstone, chert, &c.

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\* Bligh Sound. A party from the *Acheron*, surveying vessel, came upon the fresh footmarks of some natives who were heard making their escape through the thick underwood. These people, so far as could be learned, belonged to a small isolated and almost unknown tribe, rarely seen even by their own countrymen, by whom they are called wild men of the mountains.—*Notes of Captain Stokes, New Zealand Pilot*, p. 245.

On the 3rd I ascended Twinlaw with the hope of obtaining angles; but the weather proved so stormy and thick that I was disappointed. The Waiau, the great river of the west, was for the first time seen meandering through the plains which extend from the Takitimo mountains to the sea. The country to the west of the Waiau is very mountainous, rugged, and woody. The formations of Twinlaw are altered rocks and conglomerates. To the north of the hill ridges of coarse calcareous sandstone crop out, containing broken shells and minute rolled pebbles.

On the 4th we proceeded across the Waian plains, and camped in a bush not far from the limestone gorge, in a valley formed by the out-crop of limestone strata. The Orawia River was forded to-day, and its bed was noticed to contain pebbles of plutonic origin. Its banks were composed of soft shales. The first view we had of the Waian was magnificent, with its bordering, spacious terraces and banks, level plains, and scattered forests. The country passed over here good grass, but much overrun with fern and flax.

On the 5th I proceeded along the limestone ridge to the gorge of the Waian. Found the rocks to contain fossil shells in abundance, amongst which the *terebratula* was conspicuous. On comparing the specimens I obtained with the drawings of the same fossil as obtained in Europe, I find that they nearly correspond with the *terebratula porrecta*, which belongs to the Devonian group. Another species, but of which I could obtain no complete specimen, resembled the *Pecten Lugdunensis*, which is found in the Lias group. Various other shells were observed, but in too incomplete a state for satisfactory observation.

I am not aware what has been done in New Zealand towards classifying the fossils, or towards initiating a theory of age and superposition of strata founded on the classes of fossils: it appears to me that, considering the want of analogy between the existing animal and vegetable creation of the antipodes, it is but reasonable to suppose that in prior ages the same want of similarity obtained, consequently no theory can be ventured on, excepting from local observation and classification, a desideratum (as far as I know) yet to be acquired.

The ridges in the neighbourhood contain many caves, and in one of them I found the decayed bones of the moa. Moari ovens were also seen in the neighbourhood, showing that these parts had been inhabited, and not lying waste as at present. The Waiau forces its way through the limestone ridges, in a clear and well defined channel of about 400 feet broad, yet above and below this the river flows in many channels, which are subject to constant change. The river in this vicinity is nowhere fordable; but a ferry might be established at the gorge. While the eastern

plains of the Waiau are open, with clumps of bush at intervals, the western plains and mountains, with slight exceptions, are covered with forest to the snow line. The Waiau seems to have been an effectual barrier to the Moari and his fire, otherwise long ere this the mountains and valleys would have been denuded of their timber. The country to the west of the Waiau, as far as the west coast, is yet under forest; this extends 100 miles N. and S., and 50 miles E. and W. It is here then, in this only remaining ample expanse, that the Moa (a bird of gigantic dimensions, as proved by the remains of it) may yet find its last refuge; and considering the very recent indications of its existence everywhere found in the vicinity, the supposition of its existence at this present time, at least, has grounds for entertainment.

We washed the sands of the Waiau in our panmiks, and obtained one speck of gold. The channel contains stones of plutonic origin, such as granite, porphyry, and greenstone—proving the interior mountains to be composed of these.

On the 6th we washed the sands of the Orawia, but found no indications of gold.

The 10th found us camped near the head of the Aparima. To the south the country was much “honeycombed” on the surface; that is, was full of small holes closely adjacent, and indicating wet soil. This was the case on the plains, but on the hills the unfavourable surface disappeared. The formations to the west of the Aparima appeared to be generally aqueous, with occasional mingling of metamorphic rocks. Bates informs me, that before he started from Jacob River on the 6th, the crops were nearly all secured, and that the natives were preparing to proceed to the Mutton-Bird Islands.

On the 11th we proceeded to Centre Hill, arriving at 4 P.M. I immediately ascended it to take advantage of the clear weather while it lasted. From the top we obtained an extensive view of the valleys of the upper Oreti, and Waiau. The principal sources of the former are in the west slopes of the Eyre mountains. The heads of the Waiau were observed to come out of two deep gorges in the snowy mountains about 50 miles distant, and the tops of the ranges appeared 70 miles distant. The western head and gorge will thus approach within 20 miles of Milford Sound. Mr. Howell had informed me of a native track between Milford Sound and the head of the Waiau. They frequented this track and the waters of the Waiau, which they ventured upon in maggies or rafts of flax stalks, in proceeding from Milford Sound to Pahees on the south coast.

In the valley of the Waiau I saw two pieces of water, distant about 12 miles: these no doubt are the Teanau Lakes; but another is said to exist farther north.

The area north of Mount Hamilton, extending over the valleys of the upper Waiau and Oreti, cannot be less than 600 square miles. The pasturage, as far as viewed, appeared to be good, and at the same time well wooded. This day has been blowy, and excessively so to-night; so much so that it was with some difficulty that we crawled along the exposed ridges of the hill. The formation of Centre Hill is stratified, containing clay-slates and shales. The grass in the neighbourhood is generally good, but the flats are wet and mossy to some extent.

After we had lit our camp fire the wood-hens came about it as they usually do. A wood-hen or two would have been a dainty addition to our fat pork, so Bates was intent in his attempts to decoy them under his grasp, but to no purpose. The *modus operandi* he adopted being new to me, I watched his motions with no little interest. Bates first got a stick on which he made a running noose of flax; he also got another somewhat shorter on which he tied his red handkerchief in the form of two wings. He next obtained a broad leaf which he doubled, and putting it between his teeth, by drawing his breath he produced a shrill call imitating with surprising exactness that of the bird. Squatting himself on his heels, Bates, with his two sticks, set about his object with great determination. The birds were not long in answering his call, and one soon came walking up to him. Chrio, chrio, chreek! called Bates, enticing the bird to battle with his winged conjuring stick; duff, duff, duff! bouncingly answered the bird, and duff, duff, duff! as bravely answered Bates. This play went on for some time, but there was no supper to be got off the wood-hen, for she stopped short of the noose, scanning with serio-comic gravity her decoyer, first with one bright black eye and then with the other. True, his nose was as red as her own, for the summer sun had flayed it; true, his legs were as bright red as her own, for the "Spaniards" and "wild Irishmen" had struck and scratched them till they were raw. But I do not like that greedy grey eye fastened on me, says the wood-hen; it is too like that of the all-absorbing Anglo-Saxon; and she walks away notwithstanding the thousand chrio, chrio, chreeks, that poor Bates put forth for his supper. He had to eat fat pork without the longed-for accompaniment.

The 12th was wet and windy, accompanied by hail; Mount Hamilton towered amongst the clouds white with the drifting showers of snow. The weather moderated sufficiently for us to start at 10 A.M. We struck eastward, crossing the Oreti with ease, it not being above ankle deep. After crossing the Oreti, we came upon very rough ground covered with high tussacks and full of holes. We set fire to the country and continued along the lower slopes of the west Dome.\* The country having been burnt to the east-

ward, we could not judge of its nature, so it was not long ere we found ourselves in an extensive bog. We persevered in our attempts to get through it till we had got about a mile into it, when two of our horses sank to the haunches, and lay there till we unpacked them and hauled them out. We retraced our steps with some difficulty, and made for an island as darkness came on. The wind blew a cold gale over our exposed position, the ground being burnt bare of grass and scrub, yet we managed to pitch our tent and collect sticks enough to boil our kettle and fry some pork. With this we regaled ourselves, leaving for to-morrow the care of getting out our horses from the predicament into which we led them. In the mean time they browsed greedily on such grassy tufts as were sparingly found over the little island.

On the morning of the 13th we were early astir, and after some search found a place just passable for horses, and we got them through after "boggling" two of them. The 14th found us with our tent pitched on the eastern banks of the upper Mataura, where we secured our provisions and tethered our horses. This done we started with the small tent-blankets and provisions on our backs, holding for the pass that I had seen from the Dome leading into the interior, and we camped at 5 P.M., in a gully at the foot of the slate range.

As the nature of this country differs from that which we have hitherto gone over, being now mountainous and dry instead of undulating or level, much intersected by rivers and swamps, some remarks here will not be out of place regarding the mode of getting through the unexplored country of this part of New Zealand. We have crossed in all directions what is generally considered a difficult country, all our party being strangers to the same; but a little experience soon teaches what track to attempt, and what to avoid. The surest indication of country is given by the colour of the grass. If grass ahead be white, go on; it grows on hard ground: if green or brown, turn aside; it grows on soft. Taking heed of this maxim we have easily avoided ground (where it was possible to avoid it) dangerous to our horses, and when we have been at fault it has been when the country has been recently burnt, which renders the whole surface of one dark brown colour. There are many other indications of the nature of the ground. Thus, spear grass, and scrub called Tomataguru, and michimichi grow on hard ground, while the stilted tufts called Moari heads, moss, and rushes, indicate quagmire, and are never to be approached with horses.

In crossing valleys and rivers some experience is required to avoid bad ground. In the concave banks of rivers where lagoons debouch, soft mire and quicksands are often met with, and at the foot of terraces soft swamps are generally found. In crossing



from one terrace or side of a valley to the other, it was our practice to look out for a place where the river made a large sweep, so as to approach across from one side to the other. In such spots it will generally be found that the banks of the river are approachable by sand or gravel spits, left by the floods and tails of the hill spurs. The river itself, if fordable at all, will be so in the middle of the valley. At the edges of the valleys the rivers usually run deep.

The valley in which we now were is bounded on the west by the Eyre mountains, and on the east by the slate ranges. The formation of the hills is schistose, intersected by veins of quartz, in which peroxide of iron is often seen. Good roofing slate is plentiful on the east terraces of the valley.

On the 15th we were early astir, and leaving our tent and blankets we ascended to the top of the slate range, estimated to attain an elevation of 2,000 feet above the valley. After we had arrived at the top we continued along the range till we obtained a satisfactory view of the country beyond. This range divides the waters of the Clutha from those of the Mataura, and in a N.E. direction a comparatively low and undulating country stretched as far as the Canterbury province. No high mountains are seen in this direction; but our view to the right and left was limited by the high land bounding the valley down which we looked. The ascertaining the existence of an available country was all that could be attempted at present, interior exploration being foreign to the present service in which I was engaged. As far as we went pack-horses could be brought, and I saw no obstacles to their farther progress.

We saw no appearance of lakes, and on after inquiry of the Moaris it appears that Wakatip Lake must lie in the valley 5 miles higher up the Mataura, by which route they say it is easily accessible. No Moaris now living in the south have been in this direction for 16 years, and they have generally a very imperfect idea of the configuration of the interior with its lakes and rivers; so, much of their information proved fallacious. Thus, the Moaris of Jacob River maintained that the Mataura, Jacob River, and New River had their sources in Wakatip Lake.

Wakatip Lake was at one time much frequented for its greenstone, formerly an article of trade with the northern Moaris.

The scenery from the top of Slate Range was truly magnificent, for we had the bold precipitous and peaked Eyre mountains opposite us, while at our feet in the blue distance meandered the silvery Mataura, which we could trace from its source in Eyre Peak till it lost itself in the deep gorge beneath the Dome. The prospect was quite Alpine, imitating in wildness the valleys of Savoy; but here we missed the well cultivated fields and green

pastures of the "interval." When will there be an analogy in this also?

The passing day warned us to descend, so we returned to the valley, and reloading ourselves we made for the spot where we left our horses and provisions. On the way we chased two wild dogs, sending some shot into one of them. They were pure white in colour. On turning back we set fire to the grasses so as to give facility to future travellers. The constant forcing our way through high grass, fern, and scrub, has worn shoes and trousers into holes and rags. We tumble dozens of times in a day, one time over a tussock, another time into a hole; now against a "Spaniard," and then into the rough arms of a "wild Irishman;" till our legs are raw with jags and scratches, and our hands and arms are full of thorns. The hair is even worn off the legs of our horses, and their fetlocks are full of sores. On the top of the Slate Range mica schist prevailed. The formation indicates gold, but we were not successful in obtaining specimens in the bed of the river.

On the 16th we recrossed the upper Mataura and returned to the creek near Observation Bush, where we camped. We set fire to the country as we went along, and now fully 30 miles is in a blaze. This evening is calm, and the Dome mountain is on fire from top to bottom. About this time two years I was in Rome when the illumination of the Dome of St. Peter's took place. On the former Dome Nature has only given one mite of her care; on the latter man has expended the highest of his skill. Both have their characteristics. Man's work, though limited, was beautiful; Nature's, as viewed to-night, was great and terrible.

On the 19th we had proceeded to the south end of the Taringtura Downs; along the eastern edge of the same, schists and porphyries were seen to prevail, and the pasturage was of superior quality. On the south end breccias were abundant, and limestone is found more westerly, distance about 4 miles.

As the steep country terminates here, and the low land begins, it was a subject of some consequence to the public to ascertain if any road could be got, either by the banks of the Oreti or Makerewa, to New River Junction or to Invercargill. With the object of finding indications I ascended a hill and carefully reconnoitred the banks of the said rivers. Both showed herbage unfavourable for passage, particularly the Makerewa, where a dull brown swamp covered with patches of scrub was seen to extend over all the country not occupied by hills and forest. There was no use in losing time on the Makerewa, we therefore proceeded to examine the banks of the Oreti. After leaving the Taringtura Downs we got on to "honey-combed" country for one or two miles, but descending the terrace we held on to a track of hard

ground which did not continue above other two miles. Here wet country prevailed in a manner to debar the passage of quadrupeds. Seeing there was no passage this way, we returned to our camp on the Taringtura Downs, at which we arrived by dark.

A route to New River might be suggested by the Spar Bush, but this line of road is so much intersected by swamps that it would have been impossible to have taken our horses with us. It is possible that parties having more time at their command may yet find a practicable route from the Taringtura Downs to Invercargill, and I would suggest' as the most likely direction—the crossing of the Oreti 5 miles below the Downs, and thence by Macfarlane's Station.

We were at Jacob River Settlement on the 22nd, where we found the harvest with slight exceptions secured. On the 24th we proceeded to New River, sheltering ourselves for the night in an old house at Owi. On the 25th we swam our horses across the estuary of the New River, here  $\frac{3}{4}$  of a mile broad, and got to Campbell Town on the Bluff. This day I observed granite and schist, in contact and amalgamating. On the 26th we swam our horses across the Bluff Harbour, and lodged for the night at Davis's cottage, situated in Tcwai Point. This cottage is romantically placed on the shores of the Southern Ocean, in the neighbourhood of rugged rocks, kelp, and roaring surf.

On the 27th we proceeded to the ferry-house at the Toitoes, arriving at 7 p.m. The road bad, along an unfirm beach of gravel and sand extending 20 to 25 miles in length: the journey is therefore a trying one. At the end of this we had to swim our horses across the harbour, about  $\frac{1}{2}$  of a mile in breadth. From Tcwai Point to Bushy Point the formation is recent deposit of quartz pebbles, and the grass on it is inferior. To the north and east of Bushy Point as far as the Mataura, and stretching inland 3 to 7 miles, the formation consists of decayed vegetable matter, whose surface is a peat bog. In the bog lagoons of brackish water are numerous. This day has been as beautiful as could be desired, and the cool sea-breeze was refreshing.

The house that we got into at the end of our long journey belonged to an "old hand," and was as primitive as its owner. It was built of grass, with a fire in the centre, the chimney being a hole in the roof. The inhabitants consisted of an old man, a child, 6 dogs, 2 cats, 1 hen, 3 chickens, fleas innumerable, and 1 pig. The pig was the playfellow of the child, and thus, being a pet, when not in the arms of the child, had the snuggest seat at the fire.

Now as there were neither candles, chairs, nor tables, culinary and scullery operations had to go on by the fireside; these it may be imagined were done under difficulties which our old entertainer

could scarcely meet. For the pig was fond of potatoes, the dogs of beef; surrounded by such hungry myrmidons, a system of attack and defence was constantly going on, in which both mess and dishes were overturned and emptied. At length the energetic hospitality of our "old hand" prevailed, who placing our supper on the top of a chest—which had the advantage of darkness to cover the viands—I am scarcely ashamed to confess that we did all the justice to the same that ravenous appetites from a long journey are capable of.

The Toitoes harbour is safe inside, but is difficult of ingress and egress, owing to the narrowness of the mouth, and the generally very heavy surf upon its bar. The harbour is formed by the debouching of the Mataura River into the sea, which has the effect of keeping open a space at the junction of the sandy beach with the cliffy heads which would otherwise be choked up.

From the Toitoes we held along the eastern banks of the Mataura, which river we crossed near Dr. Menzies' station; thence we returned to Invercargill on the 31st, after examining the country adjacent to the Waikivi Creek. I got but slight insight into the nature of the formation to the east of the Mataura. The nature of the grasses would indicate the presence of lime; some metamorphosed rocks were observed cropping out on Kuriwau Hill. The pasturage near the coast is inferior, being overrun with fern, but it rapidly improves as we journey inland, and the scenery is strikingly agreeable.

The survey was now completed; and before returning to headquarters I may take this opportunity of venturing on a few remarks which may appear too personal to be interesting. After serving so many years in the Survey Service of India, on this my first entry on the rough duties of the Colonial Surveyor, I had the contrast of circumstances pretty sensibly defined on my memory. The species are broadly distinct. The Indian Survey officer is clothed in snow white from "sola topi" down to canvas pipe-clayed shoes. He smokes his perfumed "hooka" or the fragrant "manilla" with an air of listless satisfaction. When he walks on duty he is followed by a "Piada," carrying an umbrella to shade him from the sun, and should a gutter cross his path, two lusty "bearers" are ready to lift him over. Two or three hours of out-door exposure of his precious self suffices for the day, which done he sits at the door of his capacious tent enjoying his "otium cum dignitate" and his brandy "pance." The slightest weight distresses him—he does not even carry a purse. He has hundreds of luxuries at his command; but does he enjoy them? No: an extra mouthful of "moorgee" or glass of "simp-kin" requires three doses of nitro-muriatic acid to assist poor

debilitated nature. His hollow eye and cadaverous complexion tell a tale.

The Colonial Surveyor in these regions is clothed in fustian trousers and blue shirt, Panama hat, and stout hob-nailed shoes. He is not known from his chainman. If he smokes, it is foetid negrohead through a "cutty" pipe, and he puffs at that energetically. He has a hundred things about him; knives, needles, telescopes, matches, paper, ink, thread and buttons; these are stowed away in all corners of his dress; and then his "swag" contains his tent-blankets, and change of clothes. These with his theodolite he carries on his back, and walks away through bogs, "creeks," and scrubs, at the rate of 3 miles an hour. He cleans his shoes once a month with mutton drippings, and he lives on "damper," salt junk, and oceans of tea. His fare is homely, but it is refreshing to see his voracity. His bed is on the ground, and he considers himself lucky if he gets into a bush where he can luxuriate in the warmth of a blazing fire. In this land of equality he shares bed and board with his men, but they are not of the common sort, for "the service" is popular amongst the enterprising colonists, and he has to pick. They are men that know their place and duty.

Having partaken of the bitters and sweets of both services pretty freely, I must state that upon the whole, as surveyors are made to be killed, I prefer "*dum vivimus*" cold air and stout appetite, to a hot air and general prostration. I prefer the homely enjoyments of colonial life.

By the 15th of April I was again in Dunedin, the capital of the province, having since I left it travelled over, mostly on foot, nearly 1500 miles of difficult country, and surveyed by "reconnaissance" near  $2\frac{1}{2}$  millions of acres. I was forced to remain for five days at Invercargill to rest my horse, as it was much knocked up. As I had received orders from his Honour the Superintendent to examine the bar of the Clutha River, I diverged for that purpose, and thus had an opportunity of viewing the beautiful scenery of the delta of that river, and of partaking of the hospitality of several of its highly esteemed settlers.

The entrance of the Clutha is undoubtedly a difficult one, being crossed by a bar, and having a narrow channel with an almost constant outward current, bounded on one side by shifting sands, and on the other by rocks partly sunken and awash.

Leaving the delta of the Clutha I proceeded on to Dunedin, arriving there on the evening of the 14th April. The most remarkable features on the route are extensive wet levels, covered with that stilted tuft-grass called "Moari heads" by the settlers. The tuft is supported by a trunk of conglomerated fibrous roots,

not unlike the trunk of the date palm, without its consistency. It stands from 3 to 5 feet high, and resembles a dwarf palm: indeed were it true that Nature slowly produces alteration in genera and species, so as to graduate one into the other, a favourite theory of some philosophers, I would say of this little grass tree that it was simply an embryo palm. It is remarkably adapted to its position, for the levels on which it is found being subject to alternate droughts and floods, the trunk, by its elevation, supports the tuft of grass on its head securely above the influence of the waters.

When I left Invercargill only three houses had been built, viz., the survey office, Mr. MacAndrews' store, and Mr. Lind's house of accommodation; but as the sections had been sold, great preparations were being made to commence building operations. The site of Invercargill is nearly level, with sufficient fall for drainage and sanatory operations. It stands on a broad estuary, and is bounded on two sides by dense wood. The scenery in the vicinity is not unpleasing, and, were roads constructed, the spot may be made as agreeable as any in temperate regions.

To Captain Stokes, R.N., is due the merit of having first brought to the notice of the Society the capabilities of the district, and the advantages of its geographical position towards England and Australia. In his remarks on its eligibility for European colonization and fertility of soil I heartily concur. For the detailed expression of the opinions of the above distinguished officer I beg to refer inquirers to the 21st volume of the Society's Journals, page 25.

During the period that I was engaged in the survey I noted down the indications of the barometer and thermometer, with remarks on the weather. As these would be too lengthy, I will here, in concluding my paper, merely state the general results:—

Date.	Barometer.		Ther.		Remarks.
	Min.	Max.	Min.	Max.	
1857.					
Jan. 13 to 31 inclusive	29·10	30·25	4	74	{ These observations were at the sea level. There were 3 days of broken weather: otherwise generally fine.
February	28·60	30·08	43	76	{ These observations ranged to 1000 feet above the sea level. There were 6 days of broken weather: otherwise fine, but sometimes windy.
March ..	27·80	30·08	46	80	{ These observations ranged to 800 feet above the sea level. There were 7 days of broken weather.

## APPENDIX A.

## Comparative Vocabulary of the Malay and Moari Languages.

MOARI.	ENGLISH.	MALAY.	ENGLISH.
Aha, <i>pr.</i> .. ..	What.	Apa, <i>pr.</i> .. ..	What.
Ahau, <i>pr.</i> .. ..	I.	Aku, <i>pr.</i> .. ..	I.
Ahi, <i>s.</i> .. ..	Fire.	Api, <i>s.</i> .. ..	Fire.
Ahu, <i>s.</i> .. ..	Heap.	Apus, <i>v.</i> .. ..	Covered.
Ahuka huka, <i>v.</i> ..	To agree.	Suka, <i>v.</i> .. ..	To like.
Aka-aka, <i>s.</i> .. ..	Fibrous roots.	Akar, <i>s.</i> .. ..	Roots.
Aku, <i>pr.</i> .. ..	My.	Aku, <i>pr.</i> .. ..	I.
Amo, <i>v.</i> .. ..	To rush, to charge	Amak, <i>v.</i> .. ..	{ Torush blindly with bloody intent.
Anei, <i>pr.</i> .. ..	These.	Anu, <i>pr.</i> .. ..	Those.
10 Ata pongipongi, <i>s.</i>	Dawn of day.	Hari pagipagi, <i>s.</i>	Dawn of day.
Anahi, <i>s.</i> .. ..	Smoke.	Api, <i>s.</i> .. ..	Smoke.
Awa-awa, <i>s.</i> .. ..	A valley.	Debawa, <i>adv.</i> ..	Below.
Hiku, <i>s.</i> .. ..	Tail of a fish.	E Kor, <i>s.</i> .. ..	A tail.
Hua, <i>s.</i> .. ..	Fruit.	Boah, <i>s.</i> .. ..	Fruit.
Huru-huru, <i>s.</i> ..	Hair.	Bulu, <i>s.</i> .. ..	Feathers or down.
Ika, <i>s.</i> .. ..	A fish.	I Kan, <i>s.</i> .. ..	A fish.
Inu, <i>v.</i> .. ..	To drink.	Minum, <i>v.</i> .. ..	To drink.
Iti, <i>a.</i> .. ..	Small.	Kitchi, <i>a.</i> .. ..	Small.
Kohatu, <i>s.</i> .. ..	A stone.	Batu, <i>s.</i> .. ..	A stone.
20 Kohoi, <i>a.</i> .. ..	Thin, lean.	{ Kuras (Kuroh, Keddan), <i>a.</i> .. }	Lean.
Kopuru puru, <i>a.</i> ..	Striking.	Buru, <i>a.</i> .. ..	Rotten.
Kutu, <i>s.</i> .. ..	A louse.	Kutu, <i>a.</i> .. ..	A louse.
Mahana, <i>a.</i> .. ..	Warm.	{ Panas, (Pana Keddan), <i>a.</i> .. }	Warm.
Maikuku, <i>s.</i> .. ..	Finger nail.	Kuku, <i>s.</i> .. ..	Finger nail.
Mata, <i>s.</i> .. ..	Point of a spear.	Mata, <i>s.</i> .. ..	Edge, as of a knife.
Mata-mata, <i>s.</i> ..	Sauce.	Mata ayu, <i>s.</i> ..	Spring of water.
Matangi, <i>s.</i> .. ..	Wind.	Augin, <i>s.</i> .. ..	Wind.
Matau, <i>v.</i> .. ..	To understand.	Tau, <i>v.</i> .. ..	To understand.
Matawai, <i>s.</i> .. ..	Source of a river.	Mata ayu, <i>s.</i> ..	A spring of water.
30 Matua, <i>s.</i> .. ..	A parent.	Katua, <i>s.</i> .. ..	Elder.
Nanea, <i>a.</i> .. ..	Abundant.	Bania, <i>a.</i> .. ..	Many.
Ngahuru, <i>a.</i> .. ..	Ten.	Sapulu, <i>a.</i> .. ..	Ten.
Niko, <i>v.</i> .. ..	To tie.	Nika, <i>v.</i> .. ..	To marry.
Oku, <i>pr.</i> .. ..	My.	Aku, <i>pr.</i> .. ..	I.
Ono, <i>a.</i> .. ..	Six.	Anam, <i>a.</i> .. ..	Six.
Pa, <i>s.</i> .. ..	Father.	Pa or Bapa, <i>s.</i> ..	Father.
Pai, <i>a.</i> .. ..	Good.	Bai, <i>a.</i> .. ..	Good.
Painga, <i>s.</i> .. ..	Goodness.	Batan, <i>s.</i> .. ..	Goodness.
Papa, <i>s.</i> .. ..	Father.	Bapa, <i>s.</i> .. ..	Father.
40 Papa, <i>s.</i> .. ..	A board.	Papan, <i>s.</i> .. ..	A board.
Pikau, <i>s.</i> .. ..	A load for the back.	Pikul, <i>s.</i> .. ..	A load for a man.
Pokeke, <i>a.</i> .. ..	Small.	Kichi, <i>a.</i> .. ..	Small.
Puhangaiti, <i>v.</i> ..	To collect.	Pungut, <i>v.</i> .. ..	To collect.
Puke, <i>s.</i> .. ..	A hill.	Bukit, <i>s.</i> .. ..	A hill.
Rangi, <i>s.</i> .. ..	Sky.	Langit, <i>s.</i> .. ..	Sky.
Rima, <i>a.</i> .. ..	Five.	Lima, <i>a.</i> .. ..	Five.
Rua, <i>a.</i> .. ..	Two.	Dua, <i>a.</i> .. ..	Two.

## APPENDIX A—continued.

MOARI.	ENGLISH.	MALAY.	ENGLISH.
Tai-mati, s. . . .	Slackwater.	Ayu Mati, s. . .	Slackwater.
Tama, s. . . .	A son.	Aua, s. . . .	A son.
50 Tamahine, s. . .	A daughter.	Ana bini, s. . .	Child of wife.
Tangi, s. . . .	A cry.	Menangis, v. . .	To cry.
Tanu, v. . . .	To bury.	Tanum, v. . . .	To bury.
Tanumanga, s. . .	Act of burying.	Tanuman, s. . .	Things buried.
Tapakuri, s. . . .	A basket.	Bakul or Bakui, s.	A basket.
Tapuai, s. . . .	A footstep.	Tapa, s. . . .	Foot print.
Tarai, v. . . .	{To chip as with an adze. }	Tara, v. . . .	Toscrape off surface.
Taruiga, s. . . .	The ear.	Telinga, s. . . .	The ear.
Tata, v. . . .	To split.	Tita, v. . . .	{Tocutor hack with a sword or knife.
Tau, s. . . .	A year.	Taun, s. . . .	A year.
60 Tite, s. . . .	Spy, Scout.	Intei, v. . . .	To peep.
Tohu-tohu, v. . .	To direct.	Tuju, v. . . .	To direct.
Tua-whenua, s. . .	The mainland.	Benua, s. . . .	The country.
Tuhi-tuhi, v. . .	To write.	Tulis, v. . . .	To write.
Turi, a. . . .	Deaf.	Tuli, a. . . .	Deaf.
Turua-waenga, s.	Middle.	Tenga, s. . . .	Middle.
Wahine, s. . . .	A wife.	Bini, s. . . .	A wife.
Wai, s. . . .	Water.	Ayu or Ai, s. . .	Water.
Wai kura, s. . . .	Rust.	Karat, s. . . .	Rust.
Whakamate, v. . .	To kill.	Bekan-mati, v. . .	To cause death.
70 Whaka-miharo, v.	To cause wonder.	Bekan-heiran, v.	To cause wonder.
Whaka-owinga, s.	Act of shaking.	Bekan-goiangan, s.	Act of shaking.
Whaka-paipai, s. .	Ornamental.	Bekau-baibai, v.	To make fluely.
Whaka-ranga ran- ga, v. . . .	To boast, to vaunt.	Bekan-garang, v.	{To simulate bold- ness.
Whanau, s. . . .	Offspring.	Aua, s. . . .	A child.
Whenua, s. . . .	The earth.	Benua, s. . . .	A country.
Whero, u. . . .	Red.	Mera, u. . . .	Red.
ADDITIONAL.			
77 Kai, s. . . .	Tree.	Kayu, s. . . .	Wood.

## APPENDIX B.

Altitudes above the level of the sea in feet.

Dome . . . . .	4505	Mount Eyre . . . . .	6084
Cupola . . . . .	4045	Taringtura . . . . .	2093
Forest Hill . . . . .	898	Mount Hamilton . . . . .	4674
East Dome . . . . .	4179	N. Pk. Takitimo . . . . .	4998
Bare Hill . . . . .	2297	S. Ditto . . . . .	4582
Ship Cone . . . . .	2072	Woodlaw . . . . .	1682
E. Peak Hokanui . . . . .	2205	Mount Pleasant . . . . .	1284
Slopedown Hill . . . . .	1891	Ferndun law . . . . .	1974
N. Longwood Range . . . . .	2602	Howell's Hill . . . . .	649
S. Ditto . . . . .	2451	Omawi Hill . . . . .	696
The Bluff Summit . . . . .	879		



## APPENDIX C.

Estimated Area of the Lands of the District surveyed, included between the Maiau and Mataura rivers, and the Umbrella, Eyre, and Takitimo mountains.

*Forest Lands.*

	Square miles.		Square miles.
South Eyre .. .. .	54	Hokanui .. .. .	79
Takitimo .. .. .	14	Makerewa .. .. .	21
Wairaki .. .. .	6	Waiopai .. .. .	10
Hamilton .. .. .	4	New River .. .. .	7
Woodlaw .. .. .	6	Long Bush .. .. .	2
Bald Hill .. .. .	6	Otaramika .. .. .	3
Longwood Range .. .. .	242	Seaward Bush .. .. .	58
Spar Bush .. .. .	11	Bluff .. .. .	3
Waimatook .. .. .	4	Sundry small clumps .. .. .	10
Forest Hill .. .. .	26		
South Taringtura .. .. .	4		570

*Moss and Swamp Lands.*

Five Rivers .. .. .	7	Highburn .. .. .	2
Taringtura .. .. .	3	Lowburn .. .. .	2
Bogburn .. .. .	1	Makerewa .. .. .	4
Marshburn .. .. .	2	Waiopai .. .. .	4
Waimatook .. .. .	5	Seaward .. .. .	72
Woody Knoll .. .. .	6		108

*Agricultural Lands.*

Principally on the Mataura, Waiopai and Oreti Plains .. .. .	400
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*Pastoral Lands.*

Principally on the north of the above .. .. .	2150
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*Barren Lands.*

Principally on the ridges of the Takitimo and Eyre mountains, also the Hokanui Hills .. .. .	500
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Total Square miles .. .. . 3728

## APPENDIX D.

Population of the district included in the boundaries given in Appendix C. from the Official Census of February, 1857.

Europeans .. .. .	253
Half castes .. .. .	70
Moaris .. .. .	119
Total .. .. .	<u>442</u>

XI.—*Observations relative to the Geographical Position of the West Coast of South America.* By CARLOS MOESTA, Director of the National Observatory, Santiago de Chile, May 29, 1856.

Communicated by JOHN POWER, Esq., of Panama, F.R.G.S.

Read, June 14, 1858.

THE careful observations made by those in command of the several surveying vessels since the commencement of the present century, one of the objects being to fix the true geographical position of the West Coast of South America, refer principally to Valparaiso and Callao.

The longitudes of these two points have been determined by observations of celestial phenomena, or *the absolute method*; also by the transmission of mean time of Greenwich by chronometers, as was done, for example, in the important expedition commanded by Captain FitzRoy.

The longitudes of Callao and Valparaiso served to determine intermediate points between these two ports, also the coast of Ecuador and Panama, as well as that of many groups of islands in the Pacific. Thus, it will be seen, the great importance of knowing the exact longitude of Valparaiso and Callao in relation to the hydrography and geography of this portion of the globe.

During the last few years the port of Valparaiso has been in contact with Santiago by means of the electric telegraph, which has given us the most correct means of knowing the difference of meridian of the two places. It may be mentioned that the late experiments made as to the velocity of the electric fluid through a line of wire, show that it does not pass with the extraordinary rapidity supposed by Wheatstone; nevertheless, its passage is not less than 16,000 miles per second, and the time during which the electric fluid traverses the distance from Santiago to Valparaiso is not appreciable. In other words, a signal upon the key of the electric telegraph in Valparaiso may be transmitted to Santiago instantaneously, and *vice versâ*. Each beat of a second of a chronometer regulated to mean time of Valparaiso can be transmitted instantaneously to Santiago, and compared at the latter place with the time shown by a chronometer regulated for mean or time. The difference between these two times will give the difference of meridians of the two places. Thus it has been proved that the difference of longitude between Santiago and Valparaiso is 3m. 56.5s.

It may be mentioned, that this value expresses the difference between the meridian of the National Observatory of Santiago and that of the Tower of the Custom-house of Valparaiso, this

last being only a few steps to the east of the Castillo de Rosario, to which is referred the longitude of Valparaiso as determined by FitzRoy.

I may state that I have obtained the same value by transmitting mean time from Santiago to Valparaiso by means of a good chronometer, carrying it in the hand in a gig. I purposely made this journey the 24th of October, 1853, in 17 hours, and the interval between the two comparings of the chronometer in both places was 29 hours.

The rate of the chronometer had not altered in the least during the journey, which is a proof that this method may be resorted to for the transmission of time with much exactness from one place to another, observing the necessary precautions.

It will be seen that the operation of determining the longitude of one place in respect to another by the electric telegraph is very easy, and the method much more correct than any previously employed. To give a proof of the exactitude obtainable by this method, we may mention that probably there are no other observatories in the world whose difference of meridian has been so minutely examined for the last two centuries as those of Greenwich and Paris. This difference has been determined by thousands of celestial observations, as well as by chronometric and geodesic: when Le Verrier and Airy determined it again in 1853 by the electric telegraph established at that period between the two countries, the result was a difference less than that previously calculated in nearly a second of time. This new method appears most important to us, for geography as well as for our knowledge of the figure of the earth, it being now possible to obtain the exact position of one point in respect to another on the surface of our globe, astronomically as well as geodesically, the results of which will give us the elements to determine the curvature of its surface when such operations may be necessary.

After this digression, I now return to the subject under consideration. The exact difference being known between the meridians of Valparaiso and Santiago, we may take the meridian of the last-mentioned place as a reference for all those of the coast which formerly have been referred to the meridian of Valparaiso. I will soon show the degree of exactitude with which we now know the position of the meridian of Santiago with respect to that of Greenwich, and I limit myself here to saying that, taking for the point of comparison the meridian of Santiago, the result is *that navigators have placed on their maps the West Coast of South America too far to the west.*

It may be interesting and even instructive to record briefly the results of the observations which from time to time since the commencement of the present century have been obtained by celebrated

travellers for the longitudes of Valparaiso and Callao. I will commence with the observation which doubtless merits every confidence, namely, *that of the transit or passage of Mercury before the Sun's disc*, observed by Baron Humboldt, in Callao, the 9th of November, 1802. This observation compared with others on the same phenomenon made at Greenwich, Paris, Seeberg, Lilienthal, Berlin, Celle, and Copenhagen,\* gave for the longitude of Callao  $5^{\text{h}} 18^{\text{m}} 16^{\text{s}}$  to the west of Paris.

Later (during the years 1826 to 1836) the longitude of Valparaiso by the surveying expeditions under Captains King, Fitz-Roy, and Stokes. The result deduced from their observations of culminations of the moon, of occultations of the stars, and lunars taken at Valparaiso, gives for the longitude of the Castillo de Rosario  $\dagger 4^{\text{h}} 56^{\text{m}} 6^{\text{s}}.6$ .

The same expedition determined the difference of longitude between Valparaiso and Callao by chronometers, and adopted for this element the value of  $22^{\text{m}} 8^{\text{s}}.4$ , showing the longitude of Callao to be  $5^{\text{h}} 18^{\text{m}} 15^{\text{s}}$ ; which result differed only 1. sec. from the first observation.

The foregoing observations were subsequently revised by Capt. Beechey, $\ddagger$  and from his investigations the longitude of Valparaiso was  $4^{\text{h}} 55^{\text{m}} 56^{\text{s}}.2$ , which would give for the longitude of Callao  $5^{\text{h}} 18^{\text{m}} 4^{\text{s}}.6$ .

To the three determinations of the longitude of Callao already mentioned, I will add the last observed of importance, namely, that of the transit of Mercury the 4th of May, 1832, made by an excellent observer, Mr. Scholtz, in Lima, and Dr. Gallo, at the request of Humboldt. Mr. Scholtz deduced from this observation, comparing it with another made at Breslau of the same phenomenon,  $\S$  the longitude of Lima to be  $5^{\text{h}} 17^{\text{m}} 45^{\text{s}}$ .

From this result we easily find the longitude of Callao, seeing that Humboldt had determined the difference of the meridian of Lima and that of Callao from November 9th to December 24th, 1802.  $\parallel$  According to his observations, Callao is to the west of Lima  $28^{\text{s}}.7$ .

Thus the result of the transit of Mercury in 1832 gave as the longitude of Callao  $5^{\text{h}} 18^{\text{m}} 13^{\text{s}}.7$ . It will be seen that three of these results give, with a trifling difference, the same value for the longitude of Callao, and in view of this agreement we may believe that the longitude of Callao is now well known. Nevertheless by the observations made at our National Observatory, the

\* See Humboldt, 'Recueil d'Observations Astronomiques,' vol. ii. pp. 421-427.

$\dagger$  See 'Journal of the Royal Geographical Society,' vol. vi. p. 337.

$\ddagger$  See 'Naut. Mag.,' April, 1838.

$\S$  See 'Astronomische Nachrichten,' No. 382.

$\parallel$  See Humboldt, 'Recu. d'Observ. Astr.,' tom. ii.

result is, that the before-mentioned longitudes of Valparaiso and Callao are still affected by a considerable error. The longitude of the National Observatory is founded on a series of observations of moon culminations, and of stars, situated near its parallel (which are indicated in the Ephemeris), made at the end of 1852 with the great meridian circle of this establishment. The exactness of these last observations is without doubt greater than could have been obtained by the before-mentioned English scientific expeditions which had only portable instruments. For this reason the longitude of Santiago has been better determined. I have also compared my observations with corresponding ones made in several European observatories whose respective positions are known with the greatest accuracy.

In this manner, not only no instrumental error, neither that of the lunar tables, could have any influence in the result of the said observations. Here, then, is the position of the meridian of the National Observatory of Santiago de Chile with respect to that of Greenwich :—

					h.	m.	s.
By 35 comparisons of moon culminations with Greenwich ..	..	..	..	..	4	42	31·5
17 do. do. do. do. ..	..	..	..	..	..	..	33·2
12 do. do. do. do. ..	..	..	..	..	..	..	32·8
6 do. do. do. do. ..	..	..	..	..	..	..	34·7

From these different results, we deduce the longitude of Santiago de Chile to be to the west of Greenwich  $4^{\text{h}} 42^{\text{m}} 32^{\text{s}}\cdot 4$ , and that of Valparaiso  $4^{\text{h}} 46^{\text{m}} 28^{\text{s}}\cdot 9$ , and compared with Paris  $4^{\text{h}} 55^{\text{m}} 49^{\text{s}}\cdot 5$ .

This value differs  $17^{\text{s}}\cdot 1$  from that adopted by the English expeditions for the longitude of Valparaiso; *and by this said quantity, in nearly all maps, the whole of the West Coast of South America is placed too far to the west.*

Taking into consideration the preceding observations, we have here the several longitudes compared with that of Greenwich :—

					h.	m.	s.
Santiago .. .. .	..	..	..	..	4	42	32·4
Valparaiso .. .. .	..	..	..	..	4	46	28·9
Callao .. .. .	..	..	..	..	5	8	37·3
Lima .. .. .	..	..	..	..	5	8	8·6

For vessels making long voyages in the Pacific, particularly if on a scientific mission, the knowledge of the exact longitude of Valparaiso is of great importance. Thus it will be expedient to give this new determination the necessary publicity, communicating the same to the hydrographic departments of the various maritime nations, and that our ministry of marine cause to be adopted the foregoing longitude of Valparaiso in the surveys the national marine may make on our coasts.

XII.—*Excursion made from Quito to the River Napo, January to May, 1857.* By Dr. WILLIAM JAMESON.

*Read, June 14, 1858.*

HAVING on various occasions visited the forest that extends from the western slope of Pichincha to the shores of the Pacific, I felt desirous of descending the opposite or eastern ridge, and penetrating as far as the banks of the Napo. My object was to compare the natural productions of a region in many respects similar, but which I conceived might be somewhat modified by the continent that extends for many hundreds of miles to the shores of the Atlantic. Owing to the limited time at my disposal, I can scarcely pretend to have accomplished anything. A residence of many years would be necessary to acquire even an imperfect knowledge of the zoological department, in which there is apparently more variety than in the productions of the soil. The latter statement may not be altogether correct, because from the difficulties attendant on the journey I could not possibly examine the immense variety of forest trees that form the principal feature of a country which, since the creation, has remained unpeopled by the human race. I shall feel satisfied, however, if I have been the means of adding a few new species to the cabinet of the naturalist.

Associated with Professors Francis and Moore, of the United States, I started from Quito on the 17th January. Our road lay across the valley of Chillo, which separates the two main ridges of the Andes. It is clothed with a vegetation of mimosa, a cactus, a mulberry, and a wild cherry. In the afternoon we arrived at the farm of Itulcache, situated at the base of the eastern chain.

*Jan. 18.*—To-day we commenced the ascent of the eastern chain, and, leaving the cultivated district, we entered a region producing native grasses, affording pasture for numerous herds of cattle. At 12,000 feet we entered a forest of *Polylepis*, a middling-sized tree, the bark of which peels off in shreds from the trunk. Above this forest, which presents a sombre-green tint, there is another zone of grasses, with long wiry leaves of a yellowish green, and still higher is the ridge of Guamini, elevated to nearly 15,000 feet, and presenting a few solitary tufts of grass, intermingled with shrubby “*compositæ*” (*Chuguiraga* and *Aster*), a *Valerian*, a *Potentilla*, and other European genera. It was snowing hard when we crossed, and the narrow path being all but concealed, I could not bestow much attention on anything unconnected with my progress. Descending the eastern flank we arrived, through bog and mire, at the Indian village of Papallacta,\* where we remained for the three following days preparing for our journey through the forest.

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\* *Papa*, potato; *Llacta*, a village.

Papallacta is situated on a grassy declivity, and consists of a few straggling huts of plank, with thatched roofs. It is backed by an amphitheatre of rocks of sandstone and basalt, overgrown with shrubbery. The vegetation in the neighbourhood consists of *Barnadesia spinosa*, a *Sipho campylus*, a fuchsia scarcely distinct from *F. triphylla*, *Dumerilia paniculata*, &c. &c.

With 16 Indians we left Papallacta on the 25th January. The path is traced by the edge of a rapid torrent, and in many places there is scarcely room enough to secure a footing along its precipitous bank. At 3 o'clock we halted at an uninhabited hut, where we passed the night, and next morning, on packing our luggage, we found that nearly all the fresh provision we had purchased in Papallacta had been purloined by the Indians during the night.

*Jan. 26.*—Started at half-past 6 and pursued our journey along the bank of a broad rockystream. This we afterwards crossed by a rudely-constructed bridge formed of two logs. We shot a humming bird (new to me), feeding on the flowers of an *Erythrina*. At 12 arrived at a station named Guila, where we found a hut inhabited by a single family, whose occupation is the making of large wooden bowls and troughs for the Quito market.

*Jan. 29.*—Arrived at Baeza, consisting of three huts in the midst of the forest, and inhabited by Indians. Here we remained two days, during which I made a tolerable collection of beetles, particularly the smaller species, allied to the genus *Coccinella*. I also procured some *Trochilidæ* and a specimen of *Andigena hypoglaucus*.

*Jan. 31.*—Left Baeza. The first portion of the road ascends through a forest; afterwards there is a descent to a small stream, crossing which we again ascend through a thick matting of *Chusquea scandens*. The path was exceedingly miry. During this day's journey we again met with *Andigena hypoglaucus*, and a green species belonging to the same family. At 4 o'clock we camped on the bank of the Rio Vermejo.

*Feb. 1.*—Commenced our journey, crossing the Rio Vermejo by a bridge constructed of two slender logs; afterwards continued our route along the bank of the same river. In some parts we were obliged to travel for a considerable distance over large stones, which in former times had been its channel. Several orchids (new to me) were collected. The distance from our last night's bivouac to Tanuyacu, where we halted, may be about five miles. We arrived at 3 o'clock.

*Feb. 2.*—Started at 8, and at 11 arrived on the bank of the Cotsacacha, over which we passed. This is the most formidable river on the whole route. On a tree, overgrown with moss, I collected specimens of an *Utricularia*, with a large purple flower and a stem

only 2 inches high. After crossing the Cosanga we enter on an extremely miry road. At 2 we arrived at a station, named El Almorzadero, where we remained for the night.

*Feb. 3.*—Started at 9 and ascended by a steep broken path to the summit of the ridge named El Guacamayo (*Huaca-mayu*, sacred river). From this point there is a very long and precipitous descent, which occupied us for four hours, during which we were drenched with rain. At the foot of the mountain we crossed a rapid stream, and after travelling a couple of miles over a comparatively level surface, arrived at a station named Urcusique. Here the vegetation presents a more tropical appearance. The birds observed during this day's journey were *Andigena*, one or two species, *Rupicola Peruviana*, and *Trogon pavoninus*. Of plants the trees afforded me some curious ferns and a fine *Polytrichum*.

*Feb. 4.*—To-day I found a *Narcissus*, with snow-white flowers. (It is spread over a considerable extent of country, from the base of the Guacamayo to the woods of Santa Rosa. Another plant of the same order is an *Amaryllis*, occurring in Archidona, where the forest has been partially cut down. The *Liliaceæ* are rare throughout the Andes.) We advanced about six miles, and at 2 camped on the bank of the Rio Hondache.

*Feb. 5.*—Started at 8. Road not quite so bad as that of yesterday, excepting where we had to cross some deep ravines. In a river the Indians caught some fish of the genus *Catastomus*, and also a small species of crab. At half-past 12 it commenced raining, which obliged us to camp at a place two miles farther on.

*Feb. 6.*—To-day we advanced only three miles, from an apprehension of its raining. We halted at 12, having sent on to Archidona four of our Indians to announce our approach. The distance is said to be about twelve miles.

*Feb. 7.*—Started at 7 and ascended from the river bank by a steep acclivity; afterwards the road became comparatively level. Passed the tambo of *Curi-urcu* (golden male), distant about six miles from Archidona. To-day I found some beautiful ferns of the genera *Lycopodium* and *Trichomanes*. Mr. Moore shot a couple of finches, a complete gem of seven different colours. Finally we camped on the bank of the river *Mundi-yacu* (water), three miles distant from Archidona.

*Feb. 8.*—At 11 we entered Archidona. After traversing a forest for a space of 12 days, and having our prospect in every direction circumscribed by trees, nothing can be more agreeable than suddenly emerging from beneath a dense leafy canopy and finding oneself in an open space clothed with herbage of a bright emerald green, and enjoying a view of the distant horizon.

Archidona consists of I know not how many houses, for the greater number of them lay concealed in the forest. The few that are



visible were unoccupied, excepting one in which the Indian Governor resided *pro tempore*. We took possession of the Cabildo, or government house, built for the special benefit of the Spanish Governor and his suite: it is constructed entirely of bamboo and thatched with grass. There was, in fact, no one but ourselves in the village, not even a dog. Here we remain for a day or two to rest from the fatigues of the journey.\*

Early next morning we were waited on by the Indian Governor and his suite, or the justices (*las justicias*) as they are termed. Each of these functionaries carried a long staff with a silver handle, and was attended by several Indians, bringing us a supply of ripe plantains, yucas, the root of an Arum called Mandi, fowls, and eggs. These several articles of food are all that Archidona affords.

The Indians of Archidona† are taller and of a more symmetrical configuration than those of the cold table-lands of the interior. Their colour is of a deeper bronze, or red—the latter tint being probably communicated by the constant and liberal use of annatto (*beza*), with which they paint their faces and extremities. Their dress consists of but two articles—a small poncho of a coarse cotton manufacture, dyed purple, and a pair of very short drawers of the same material, leaving the legs and thighs completely exposed. The hair is universally black, and occasionally, although very rarely, curled. They use neither hat nor shirt, and are unacquainted with the use of soap. A necklace of beads of white enamel is a decoration in great request, particularly with the women, whose form and features I must confess are inferior to those of the men. Probably this may be occasioned by the hard work to which the former are subjected in early life. Their language is the Quichua, being the same as that spoken by the Indians of the interior. They prefer living apart from the Spanish race in the distant recesses of the forest, where they cultivate various tropical plants that serve them as food; but what they prefer to every other kind of aliment is the pulp or fruit of a palm named chonto. It is produced in clusters, each fruit being of the size of a pigeon's egg, and of a deep red colour. It is boiled in water to separate the nut, and the pulp is formed into a mass presenting a bright orange tint. All that is now necessary is to diffuse it in cold water and drink it off.

Hunting is their chief occupation, and every variety of game is procured by the dexterous use of the blowpipe. The poison with

\* Archidona was founded in the early times of Spanish power, and was once a flourishing station of the Jesuit Missionaries.—*C. R. M.*

† The Indians of Archidona are of the same race as the natives of Quito. They both speak a corrupt dialect of the Quichua language.

Acuña, in 1639, found that the best route from Quito to the Napo was by way of Archidona.—*C. R. M.*

which the arrows are tipped is prepared in the Brazilian frontier and sent to the Napo as an article of traffic.

They have no domestic animals excepting the hog. Cattle have not been introduced, although there is abundance of pasture for their support. Of the feathered tribe a common fowl is exchanged for 2 lbs. of salt, or sold for a quarter dollar. They domesticate several native birds, among which I observed the agami (*Psophia crepitans*) and the pauxi (*Crax alector*), which associate with the poultry.

They prepare ardent spirits from the fermented fruit of the plantain: its quality is bad. Of the cerealia no species is held in estimation, not even maize, a grain of American origin. Rice can be obtained in limited quantity in Santa Rosa, where it is raised by the few Spaniards there established. The sugar-cane attains a large size; but it is not, as in civilized countries, made available for the preparation of sugar, rum, or molasses.

The Indian eats all sorts of offal. While I was preparing the skins of various birds obtained in the forest, the soft parts were greedily coveted and appropriated by these savages, and devoured with the intestines.

During the day we were unceasingly tormented by sand-flies. The Indian, who, as before remarked, is nearly in a state of nudity, is constantly slapping his arms and thighs to kill or drive away these minute insects. To a person ignorant of the cause all this appears very ludicrous. The flies disappear at sunset; but the traveller who passes the night unprotected by a mosquito curtain will most probably awake with his hands and feet bleeding from the bites of a small bat. It is not the vampire, but a much smaller animal of the size of the common European species. The wound is inflicted instantaneously, with a loss of substance as if the part had been dug out by an iron instrument.

*Feb. 9.*—Of humming birds we procured two species of *Phaethornis* and the scarlet *Tanager* of the United States. I also found, overhanging the river, a small epiphytal and semi-aquatic fern, to the roots of which were appended tubercles filled with ants.

*Feb. 12.*—Arrived at Tena, 10 miles distant from Archidona, and on the road to the Napo.\* This is a new village, and the Indians had just finished the *cabildo*, of which we, as usual, took possession. It is picturesquely situated on the banks of a stream flowing to the Napo.

*Feb. 13.*—From Tena to Napo there is a distance of about six miles. We remained at the port of the Napo till the 22nd, and I found it nearly impracticable to enter the surrounding forest—a

\* Acuña says that the distance from Archidona to Napo is one day's journey on foot in winter, and that in summer the journey may be performed on horseback.—*C. R. M.*

difficulty arising from the quantity of luxuriant grass and jungle that had sprung up in all directions. The village consists of about 25 or 30 houses, constructed of cane, on a level with the ground, and thatched with grass.

*Feb. 19.*—I took leave of Professors Francis and Moore—these gentlemen, rather than return with me to Quito, preferring to descend the Amazon and embark in Pará for the United States. I now felt desirous of visiting the villages of Aguano and Santa Rosa, situated on the left bank of the Napo, and considerably farther down.

I embarked in a canoe made of a single log, 13 yards long by  $\frac{1}{2}$  in breadth, and having a flat bottom. I took three Indians, and without an effort on their part we descended at the rate of seven knots. The stream is in many places shallow, and foamed over large masses of primitive rock. When the river is swollen by freshets, the navigation is considered dangerous. All that is required is to steer the canoe in a right direction to avoid these obstacles. We arrived at Aguano in somewhat less than three hours and a half, and I was immediately waited on by the Indian Governor and the justices, from whom I obtained the customary supply of provisions in exchange for cotton, cloth, needles, and thread.

On the opposite bank some Indians were occupied in washing the gravel for gold-dust. The quantity of precious metal collected by each individual is trifling, scarcely amounting, I am told, to a casultam (96 grains) in three or four days.

To-day we had for dinner the flesh of the sea-cow, named *Vaca marina* by the Spaniards. It is brought, salted, from the Marañon, and, although fishy, is tolerably well tasted. It is probably the flesh of the manati.\*

An Indian brought me 34 specimens of *Chrysophora chrysochlora*. This splendid beetle is very common, feeding on an arborescent mimosa.

*Feb. 25.*—The Indians killed a jaguar in the neighbouring forest. They had cut off the tail; but it measured, from the nose to the root of that appendage, 45 inches. It proved to be a male, and was not considered full-grown.

We shot a kingfisher, whose length, including the tail, measured 7 inches (throat white, breast ferruginous, belly white; head, back, and tail dark green; coverts of the wings spotted with white). Three species of swallow inhabit the banks of the Napo, one of which is distinguished by the predominance of white in the plumage. Of aquatic birds there is a tringa, prettily marked with black and

\* The Indians of the Napo make shields of the skin of this fresh-water seal. The *vaca marina* abounds in the Amazons and its affluents. It feeds on the herbage which hangs from the banks of the rivers.—C. R. M.

white, an egret, a cormorant, and a duck; but of the latter I cannot say anything for want of specimens.

*March 2.*—I embarked for Santa Rosa and arrived early on the same day. I was next visited by the Spanish Governor, to whom, during my brief sojourn on the banks of the Napo, I am indebted for many acts of kindness. This person, who held the rank of lieutenant-colonel in the Ecuatorian army, had been 18 months ago tried for the crime of assassination, convicted, and condemned to suffer the penalty of death; but the President of the Republic, in consideration of former services as an officer, modified the sentence of the law by banishing him for 10 years to the Napo. Here by good conduct he merited the approbation of the late Governor of this province, who, during an absence of 7 months in Quito, actually authorized him (the convict) to act in the same capacity that he did.

I met with four other white people residing in Santa Rosa—two Peruvians, a Portuguese, and a native of Barbacoas. They had formed small establishments in the neighbourhood yielding plantains, yucas, rice, sugar-cane, and coffee, in quantity merely sufficient for their own private consumption, there being no demand for these necessary articles.

*March 6.*—I took a canoe and crossed the river, which might be about 300 yards in breadth. I was accompanied by some Indians belonging to the tribe called Záparos. These savages, whose only article of clothing consists of a shirt made of the bark of a tree, inhabit a territory named Canelos, and are in a state of continual warfare with the neighbouring tribes.\* They have no fixed residence, but roam through the pathless forest, arriving at any desired point by a peculiar faculty they possess, which may be termed instinct. War and hunting are their chief occupations. They are unacquainted with the use of firearms, but assault their enemies with the spear. This weapon is generally made of a hard wood, named chonta, produced by a species of the palm. Their hunting implements are the bodaquera, or blowpipe, a tube made of hard timber, five yards in length and about three quarters of an inch in diameter. A small arrow of split cane, five inches long and pointed like a needle, is wrapped at the other extremity with cotton, so as to fit the tube, and its point is dipped in a poisonous extract prepared of certain vegetable juices. An ample supply of these arrows, ready for use, and contained in a bamboo tube, is usually slung across the shoulder. Thus equipped, they plunge into the forest in pursuit of game, and so potent is the poison, that when a large animal, as the tiger, is slightly wounded, it is speedily overpowered.† The same fatal drug is employed by the Indian of the

\* This is the land of which Gonzalo Pizarro went in search.—*C. R. M.*

† Acuña says that this poison destroys life the moment the arrow draws blood.—*C. R. M.*

Amazon in attacking his enemy. In Santa Rosa I was presented with one of these implements in the shape of a javelin formed of hard wood, three yards in length, finely polished, pointed at the extremity, and poisoned. This I was told is used as a missile, and with unerring effect.

When the native Indian of the Napo, from harsh treatment by the whites, takes refuge in the forest, the Záparo is employed, like a bloodhound, to discover his retreat. It is merely sufficient to point out in a general way the supposed direction of the fugitive, and the Záparo is never known to return without his prey.

Canélos is covered by an impenetrable forest, intersected by rivers and ravines. It derives its name from the cinnamon, with which it abounds, constituting an important article of commerce with the interior. The dried calyx alone is used as a spice, and its flavour resembles a mixture of cinnamon and cloves. Stream gold is also collected in small quantity, but of a superior quality, yielding at the rate of 23 carats. Twine is manufactured from the fibres of a plant of the order Bromeliaceæ.

While I was perambulating the woods of Santa Rosa, the Záparos amused themselves by felling a gigantic tree, tenanted by various birds, which had built their nests in its branches. After about two hours' work with the hatchet, the tree fell with a loud crash, and immediately there was a rush to secure the young birds. On one of the highest branches a pair of fishing hawks had built their nest. During the operation of felling, the old birds did not stir; but when the tree was in the act of falling, they, along with the other birds, took flight. The nest of the hawk contained but one bird, clothed with white down. Still lower there were several pensile nests of an oriole and a molmot, all with young; and lastly, where the branches of the tree bifurcated from the trunk, were several nests of hornets. I was told that this is the usual way by which the Indians obtain and domesticate monkeys, parrots, and other birds of the forest.

The language of the Záparo is not the Quichua, but another dialect, quite distinct and unintelligible.

*March 9.*—Embarked on my return, accompanied by three Indians provided with long poles, to force the canoe against the current. It requires four days to ascend to the point from which I originally started, whereas the descent from thence to Santa Rosa is achieved in six hours. About 4 o'clock we arrived at the deserted village of Napotoa, where we remained for the night.

*March 10.*—At half-past 2 arrived at Aguano, where we stayed the two following days, the state of the river being such as to render the ascent unsafe. I purchased, for the price of three dollars, half

\* The language of the *Zaparras* is one of the great family of dialects allied to the *Pano* and *Omagua*.—C.R.M.

a hundredweight of rock salt, brought from the banks of the Amazon. This is used as an article of traffic with the Indians of the Napo and Archidona to obtain provisions.

*March 12.*—Left Aguano after engaging two Indians, in addition to those from Santa Rosa. The latter part of the ascent is attended with more serious difficulties. I had to-day an opportunity of examining the rock forming the bed of the river, which in some places is composed of clay slate, in others of mica, with nodules of quartz. At 3 we arrived at a point named Latas, over which the current foamed with appalling force. We had all of us to disembark, and the Indians by main force dragged the canoe up the rapid. Here the bank of the river formed a lofty precipice, over which it was impossible to descend, and we had, consequently, to cut our way through the forest, regaining the river at a more accessible point. After a vast deal of labour and fatigue we, a little before sunset, found ourselves once more on the bank of the river, and, to my great satisfaction, the canoe was waiting for us. Passing to the opposite bank we found a house, and there remained for the night.

*March 13.*—Embarked at 8, and at 10 arrived at the port of the Napo.

During this short expedition all I have seen convinces me that the Napo cannot in the present century ever become a place of importance in any point of view, whether commercial or agricultural. From Quito it is all but inaccessible after a long and protracted journey on foot over rocks and precipices, to say nothing of the formidable rivers it is necessary to ford. On the other hand, the voyage to the Amazon requires 15 days; but the return from thence is not accomplished in less than three months, owing to the force of the current. These considerations must for ever paralyse the hopes of the colonist who might feel inclined to form an establishment on its banks.\*

*March 17.*—Returning to Archidona, where I arrived late in the afternoon. There was not a single Indian in the town, and consequently no provisions procurable. We should have had to go to bed supperless were it not for a small supply brought from Quito previous to undertaking the journey. Here I was doomed to remain for more than a month, waiting the arrival of the newly-appointed Governor.

A Governor of Napo receives his appointment every four years, under the pompous title of Governor of the East (*Gobernador del Oriente*). From the public treasury he draws a salary of 700 dollars; but this amount would not be worth his acceptance were

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\* Acuña, Villavicencio, and others, who knew the whole course of the Napo, from Archidona to its junction with the Amazons, were of a different opinion.—*C.R.M.*

he not permitted to traffic with the Indians, which, in his official capacity, he easily contrives to do to the exclusion of all excepting a few privileged individuals, probably his own relations. Once installed in office, he assembles the Indians who reside within his jurisdiction, and distributes to each various articles purchased in Quito, such as cotton cloth of Indian manufacture, cutlery, needles, thread, &c., obliging them, within a very limited time, to present in exchange gold-dust and twine. This would be fair enough did the compensation in the articles to be received bear a just proportion in value to the goods distributed. An Indian, for instance, receives five yards of coarse cotton cloth, worth altogether 2s. 6d. in English money, and pays in return one castellano of gold-dust, whose intrinsic value is four times the amount. In like manner a pound of twine is purchased at the rate of 6d. and sold in Quito for half-a-crown. Is it, therefore, to be wondered at that a Governor, when his term of office expires, has amassed probably 6000*l.* or 8000*l.*—a very considerable fortune in this country?

*March 28.*—To-day the brother-in-law of the late Governor arrived, and I requested of him to use his influence in procuring for me 12 Archidonian Indians, with whom I could return to Quito. At length Friday, the 10th of April, arrived, the day appointed for my final departure. With 15 Indians carrying my luggage, I started ahead at 8 o'clock, and at half-past 12 arrived at the tambo of Curiurcu. The Indians, however, did not appear till 5, and I began to fear they might have returned to Archidona, carrying with them my bed and provisions. The road was very bad.

*April 11.*—Torrents of rain, which continued with very slight intermissions throughout the day. We made a short journey and camped on the farther bank of the Osoyacu, passing the night beneath a shed hastily constructed.

*April 12.*—Rained during the whole night, and continued so till half-past 10, at which hour we proceeded on our journey. At half-past 4 arrived at the tambo of Ninacaspi. Road very miry from the continued rain.

*April 13.*—Started at 9, and at half-past 11 reached the bank of the Rio Hondache—a deep stream, as the name implies. It was moreover very much swollen, and we could not cross to the opposite bank; we were, consequently, obliged to remain for the night. It rained heavily till 3 o'clock in the afternoon.

*April 14.*—Early this morning I found myself in a very embarrassing situation. One-half of the Indians who carried my baggage deserted during the night and returned to Archidona, while another Indian, in whom I had some confidence, threw away my collection of plants and insects and proceeded in an opposite direction, under the ostensible pretext, as I was afterwards told, of

accompanying an ignorant Catholic priest, recently appointed to officiate as curate of the province. We were altogether five in number, in a boundless forest, remote from any human habitation, scarcely sheltered from the rain, and with a scanty supply of provisions. After due consideration I sent a messenger to Archidona with a note requesting the aid of six Indians, for otherwise it will be impossible for me to proceed. Here I suppose I must remain for at least four days; for until I am joined by the people from Archidona, and with them the provisions, I am forced to be very careful in expending my actual supply. I have, by way of reserve, a few pounds of rice, which I dare not touch till I make farther progress on my journey homeward, or till I cross the Cosanga, the passage of which, when swollen, cannot be effected. It is a much more formidable stream than the Hondache, where I am at present located.

*April 15.*—It ceased raining during the preceding night. Of birds we saw a yellow-breasted toucan, whose plaintive note resounded through the forest. A very large butterfly, with wings of a rich blue, was by no means uncommon.

It is not to be wondered at that the country as far as the Napo is deluged by perpetual rain, for we are on the eastern side and within a few miles of a lofty ridge, clothed with an impenetrable forest and shrouded in mist, named El Guacamayo. From the base to the summit there is, I should suppose, an ascent of 6000 feet, and in the space of four hours we pass from a warm to a cool climate. The descent on the western side, terminating in the Cosanga, is much less considerable.

It did not rain till 2, and, being favoured with a few hours of fair weather, I was enabled to add to my collection several new ferns and some Lepidoptera, caught on the river bank. We shot a rupicola, with obscure plumage. At 3 raining heavily, and continued so during the whole night.

*April 16.*—Still raining till 7 A.M. At 11 recommenced raining. At 4 P.M. thermometer 66°. At half-past 7 P.M. we felt a strong shock of an earthquake, which lasted nearly a minute, and was attended by a crash, occasioned by the fall of trees in the forest, giving rise to a sensation sufficiently awful in this solitary spot.

*April 18.*—I could wait no longer for the Indians, and therefore, at the risk of losing my collections, I started at 9 on my return to Archidona. I have no alternative, for my provisions are nearly exhausted. From Archidona, distant two days' journey, I can send six Indians to fetch my luggage. I begin to distrust these people, and shall write to Quito for Indians of the interior to accompany me to my home.

At half-past 4 arrived at the Osoyacu, which I could not cross on account of the flood.



*April 19.*—Crossed the river and proceeded. At half-past 9 arrived at the tambo of Curiurcu, where I met with six Indians bringing me the provisions I had applied for, now too late to be of much service to me. Sent four of them to Hondache to convey my luggage to Archidona, where I arrived about 3 o'clock.

Here terminates my journey for the present. Were I swayed by superstition, I might say the bad luck attending it was occasioned by setting out on Friday, and especially on a Good Friday.

The idea of travelling to Quito over a narrow path, in many places knee-deep in mud, and of fording rapid and deep streams, is anything but agreeable. Nor are the fatigues of the journey relieved by the contemplation of the varied productions of the soil, which for the most part pass unnoticed, for the simple reason that, to avoid the formidable impediments of thorns and stakes, every step onward must be warily made. Another obstacle, less dangerous but perhaps more inconvenient, is the occurrence of fallen trees undergoing different stages of decay, for the natives never take the trouble of clearing the road. To such grievances add the constant tropical showers with which the traveller is drenched. Hungry and fatigued, he may be fortunate enough to arrive towards evening at one of those miserable sheds which may, probably, stand in need of some additional repair. Then comes the difficulty of lighting a fire with wood freshly cut and hardly combustible, but which emits volumes of smoke. At last he retires to rest with the comfortable assurance that similar trials must be endured the day following, and for many days in succession.

*April 25.*—This morning the brother-in-law of the late Governor set out on a commercial tour to the Napo and its dependencies, leaving me in the government house, where I intend to wait the arrival of the new Governor. Besides myself, son, and servant, the only other occupant is a young man who, for some crime, has been banished to the Napo for a period of six months. He is the natural son of a *gentleman*, a native of Guayaquil, known by the surname of El Perjuicio, from a habit of calumniating every one who has the misfortune to make his acquaintance. Since visiting this province it has been my lot to be brought into contact with some strange people.

*April 26.*—An Indian arrived yesterday evening with the joyful tidings that the Governor would arrive to-day. He accordingly made his appearance in the afternoon, and was received with all due honour, passing to his future residence under arches made of palm-leaves. To me it was a novel spectacle. Only conceive to yourself the Governor of the Eastern province entering barefooted, all bedaubed with mud and mire, and accompanied by a host of wild Indians. He is a man of colour, and holds the rank of lieutenant-colonel in the Ecuatorian army. Formerly he was by trade

a shoemaker, and might, to the present day, have exercised that vocation but for the revolution of 1845, caused by the very unpopular government of General Flores. He (the Governor) took an active part in the revolutionary struggle, exchanging the awl for the sword. The late President, General Urvina, conferred on him his present appointment as a requital for his services.

I spent four days very agreeably in the company of this worthy person, who obligingly furnished me with the number of Indians I required for my journey to Quito. On the evening before my departure I received a note from Mr. Edwards, an American established on the Napo, stating that Professor Francis had been dangerously wounded by the accidental discharge of Mr. Moore's gun in the hands of the latter. This accident occurred a few days ago in Santa Rosa. I have every reason to be grateful to the Divine Providence for preserving me in sound health during this long and perilous journey. I started from Archidona on the 1st of May, and arrived in Quito on the 14th of the same month.

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### XIII.—*Description of the State of San Salvador, Central America.*

Communicated by JOHN POWER, Esq., F.R.C.S.

*Recd.*, June 14, 1858.

#### THE FRONTIERS AND DIVIDING RANGES OF THE RIVERS.

THE Republic of San Salvador is that part of Central America which extends, on the Pacific coast, from  $87^{\circ} 37'$  to  $90^{\circ} 2'$  longitude east, and from  $13^{\circ} 7'$  to  $14^{\circ} 24'$  latitude north. The whole State is 55 leagues in length by 23 in mean breadth, and contains therefore (a little more or less) about 1265 square leagues of territory; the greatest length lies between the River Goascoran and the River Paza, and its narrowest part from the Bay of La Union to the eastern frontier near Santa Ana. A line drawn from the port of La Libertad to the town of Citalá (department of Chalatenango) would show its greatest breadth, while another from the union of the River Torola with the Lempa, to the opening of the latter in the sea, would be the measure of its narrowest width. San Salvador is bounded only to the w., n., and n.w. by other States, on the e. and s. by the water of the Pacific; between Guatemala and Honduras on one side, and San Salvador on the other, the frontiers are formed by almost inaccessible chains of mountains. The eastern line of limits begins in the Bay of La Union, ascends the River Goascoran to the mouth of the River Pescado, following the latter up to its head waters, from whence it crosses the mountains to the River Torola, leaves

this and follows the mountains, which towards the E., N., and W. surround Arambala, San Fernando, and Torola (department of San Miguel), returns again to the river of this name, and following the current downward until it meets with the River Lempa, whose course it follows upward as far as the village Dulce Nombre de Jesus (department of Chalatenango), where it takes a turn northward of the towns Arcatao and Manaquil (department of Chalatenango), until it arrives at the Sumpul, which river then forms the frontier line as far as San Fernando (department of Chalatenango); in this point it crosses the mountains and River Lempa between the towns Citalá—farthest point of Salvador and Ocotepeque—the first of Honduras; from the right bank of the Lempa it follows the crests of the Cordilleras as far as the River Languiatú: the range of mountains which give rise to this river go to form the union of Honduras, San Salvador, and Guatemala. The limit with Guatemala is formed principally by the River Languiatú, until within two leagues of its mouth (in the lake of Guija), passes over a hilly elevation to the mouth of the River Ostua, which descending, it falls into Lake Guija. This lake belongs in two-thirds of its extension to the State of San Salvador, the remainder to Guatemala. From the southern banks of the lake, the line of limits passes over the ridges of the mountains which bound the said lake on the S. until it meets with first the rivulets (E. of the volcano of Chingo), which unite with the River Paza; from this point this river forms the limits with Guatemala until it falls into the Pacific. Having indicated the limits of the State, I will now endeavour to give a topographic description of the Republic.

The State of San Salvador has only two lines of waterparting, of the 2nd and 3rd class, that is to say, ranges of mountain, causing the river to descend directly (3rd class) or indirectly (2nd class) into one and the same ocean. The line of separation of the waters of the second class is produced by a chain of mountains in the N.W. and N. of the State, formed by the volcanoes of Sociedad and Cacaguatique (department of San Miguel), the heights of Sensuntepeque and Ilohasco, farther on by those of Chalatenango, Mount Redondo, Dulce Nombre de Maria, Jocotan, as far as the Peak of Palma, and finally the mountain ranges of Citalá and Metapam. The River Lempa breaks this chain of mountains three times; first, in the place where it receives the Torola; the second, at the entry of the River Sumpul; and the third time between the mountain ranges of Citalá. All the streams of water produced by those mountains go to form the River Lempa, which falls into the Pacific.

The dividing line of waters of the third class is formed by the chain of volcanoes which run from E. to W., almost parallel with

the coast line of the Pacific. This chain consists of the volcanoes of Conchagua, with its spurs, San Miguel, Chinameca, Jucuapa, Tecapa, San Vicente, besides the mountains which begin to the E. of the River Giboa, extending near Gnaimoco and the volcano of St. Ana. From this point the separating line passes over the declivities of the mountains in the valley of San Antonio (department of Santa Ana); then follows the heights which to the W. and N. surround the city of Santa Ana, and terminates in the peaks of the mountains which shut in the Lake of Guija, towards the S.; for this reason the volcano of San Salvador, and that of Siguatepeque, belong to the division line of the second class.

As we have before remarked, all the waters resulting from one and other line of division fall into the Pacific. A list of the most noted rivers and lakes will be found in the following description:

The largest and most important river is the Lempa, which arises in and near Esquipulas (Guatemala), enters within the State of San Salvador near the town of Citalá (department of Chalatenango), and flows in a very tortuous course for 89 leagues into the Pacific. By this river all the streams flowing from the second class of waterparting arrive into this ocean: notwithstanding the immense body of water, its length and breadth, this river is not navigable for more than 8 leagues above its mouth, that is to say with river steamers. Farther up, owing to the numerous sandbanks and rapids, navigation is almost impossible. Sandbanks also abound in the part most navigable, and render the entrance very difficult.

The bed of the Lempa, in relation to its depth and breadth, may be divided into five classes in the following ratios:

From Citalá to the mouth of the River Santa Ana, 50 yards width, 5 yards depth.

From the Santa Ana to Suchitoto, 80 yards wide,  $7\frac{1}{4}$  do. deep.

From the latter to San Juan Lempa, 120 do. wide,  $7\frac{1}{4}$  do. deep.

From San Juan Lempa to the rapids caused by spurs from the volcanoes of Ticapa and San Vicente, 150 do. do., 8 do. do.

From this point to the sea, 200 do. do.,  $8\frac{1}{4}$  do. do.

(The above may be taken as the mean, there being points in the river deeper and shallower than here noted.)

According to calculation made from different parts of the river, especially towards the end of May and beginning of September, when the Lempa may be considered to have its mean quantity of water, the entire quantity it would contain has been estimated at 3,761,610,000 cubic feet, discharging every minute into the sea 1,285,081 cubic feet. And supposing all supplies to be cut off at one and the same moment, the Lempa would require 49 hours 44 minutes to empty itself completely. The mean velocity of its current is  $1\frac{1}{4}$  leagues per hour.

During its course within the State of San Salvador, the following streams unite with the Lempa : from the frontier to the channel connecting it with the Lake of Guija, only small rivulets fall into it from the sides of the neighbouring mountains ; the Desagüe brings the water from the lake into the Lempa, as well as from the neighbouring smaller lakes : the channel is first bounded by elevated mountains and fields of lava, and after a tortuous course of 4 or 5 leagues arrives at the Lempa on its right bank. By another branch from the lake, whose channel is less rocky and uneven, it unites with the first, near and to the E. of the valley of Guajoyo.

From the Desagüe as far as the great bend by which it makes its exit from among the high mountains, which belong to the middle part of the course of the Lempa, the lateral streams are again insignificant ; but from this point onward it receives its largest tributaries, as the River Santa Ana, River Sucio, Chiconhueso, Agua Caliente, Rio Tejutla, Acelhuate, Rio Grande, Comalapa, Tamiulasco, Quezalapa, and, lastly, the River Sumpul. Besides these, there are many smaller streams that enter the Lempa at this point. (From the River Sumpul to the Desagüe may be considered as the middle part of the Lempa, and from the union with the Sumpul to the sea its inferior portion.) The Sumpul arises within Honduras in the Cordilleras, and enters into San Salvador about 8 leagues north of San Fernando (department of Chalatenango) ; its channel is narrow and deep, and its distance from San Salvador is about 24 leagues.

In the last part of its course, with the exception of some streamlets, it receives the large streams of Guarajambala of Honduras, River Torola, Titiguapa, Tamarindo, Sesore, and lastly the Acaguapa, which is the last branch of any consequence which falls into the Lempa. Of all the rivers just mentioned the Torola alone merits any consideration ; it arises among the mountains of San Juan in Honduras, runs about 17 leagues within San Salvador ; the current is exceedingly rapid and very deep towards its lower portion.

There belong to this division of the rivers certain lakes, the principal of which is that of Guija, which has a superficial area of  $18\frac{1}{2}$  square leagues, including also the smaller lakes united with it. Besides, there is also the lake, or rather marsh, of Zapotitan ; the lake of Apastepeque (Department of San Vicente) ; and the lakes formed by the craters of Cuatepeque and Cascatlan (department of San Salvador) ; lastly, the lakes of the volcanoes of San Salvador and Santa Ana, which, having no known outlets, do not belong to this division of waters, only for their position. There fall also into the Lempa streams of hot water from the volcanoes Tecapa, San Vicente, and of the mountains of San

Jacinto (department of San Salvador), and Santa Ana; besides two called bloody streams from the mountains of Sensuntepeque and Dulce Nombre de Jesus (department of Chalatenango), whose composition we shall again refer to.

The rivers, lakes, and streams or springs, which belong to the third class of the dividing lines of waters, are first those falling into the Bay of La Union—the River Goascoran, which for 12 leagues forms the frontiers of the State, having its origin in the Cordilleras of Honduras, also the River Pasaquina, the Sirama, and the River Palimita, with some small branches. Into the Pacific fall the Rivers San Miguel, Jiboa, and the Paza—the last for 21 leagues forms frontier limits with Guatemala. Besides these three great rivers belonging to the same division line, there enter into the Pacific directly or into the creeks and inlets of the same—the Rivers Sonsonate, Izalco, Izote (department of Sonsonate), Comasagua (department of San Salvador), Comalapa and Jalponga (department of La Paz), Goajoyo (department of San Vicente). The same with respect to the lakes of Llopanjo ( $9\frac{1}{2}$  square leagues), Camalotal, and Chalchuapa. Although not properly belonging to this class, because having no outlets, yet worthy of being mentioned, are the volcanic lakes of Chinameca, Tecapa, San Juan de Dios, Apaneca, and Lagunita. The hot springs of this division are those of Ahuachapam, arising from the spurs of the volcanoes Lajunita and Apaneca. The Tables in pp. 354, 355, will exhibit a more compact view of the principal rivers and lakes of the State.

#### DESCRIPTION OF THE SOIL.

The soil of the State consists of two distinct varieties; volcanic and alluvial. The first is formed—1st, by the chain of volcanoes, which in the south of the State runs along the coast of the Pacific, and is so named—2nd, the lower chain by the abrupt and precipitous lands lying between the Pacific range and the following; and 3rd, by the chain of Cordilleras to the north, which we call the upper chain. It begins with the volcanoes of Sociedad and Cacaquatique, and extends to the heights of Metapam.

The alluvial soil is found dispersed over all the State, but generally in small portions: the greatest superficial extent continuous is to be found in the district of Gotera (department of San Miguel), although its elevation has been owing to the activity of the ancient volcanoes of Sociedad and Cacaquatique. The land between the lower chain of volcanoes and the upper Cordillera, a vast field where the surrounding volcanoes have fought out their ancient battles, we shall designate as the middle ground: there exists an inferiority of smaller volcanoes, which at the time of the formation of the Cordilleras were either then produced, or, if already

TABLE OF THE RIVERS.

Names.	Origin.	Falls into.	Length in Leagues.	Division Line of Waters.	Observations.
Lempa ..	Esquipulas in Guatemala	Pacific	89	2nd	Forms the Frontier in its lower part.
San Miguel ..	Volcan of Soledad and Cacaquatique	Desagüe	37	3rd	Upper and Middle Frontier line.
Sumpul ..	Honduras ..	Lempa	24	3rd	Middle and lower line of limits.
La Paz ..	Guatemala ..	Pacific	21	2nd	
Giboa ..	Barrancas of Cojutepeque	Desagüe	21	2nd	
Acehuate ..	Near Old San Salvador ..	Lempa	17	3rd	
Torola ..	Honduras ..	Desagüe	17	3rd	Lower Frontier line.
Sueio ..	Laguna Zapotitan ..	Do. ..	17	3rd	
Santa Ana ..	Volcan and Cerros of Santa Ana	Do. ..	16	3rd	
Ixote ..	Near the Volcan of S. Mareelino	Pacific	15	2nd	
Tamulasco ..	Cordillera of Chalatenango ..	Lempa	14	3rd	
Titiguapa ..	Between Ilobasco and San Pedro	Desagüe	14	3rd	
Agua Caliente ..	Cordilleras of Palma ..	Do. ..	14	3rd	
Goascoran ..	Honduras ..	La Union	12	2nd	Lower part of limits.
Acaguapa ..	Volcan of San Vicente ..	Lempa	12	3rd	
Sesore ..	Volcan of Cacaquatique ..	Desagüe	12	3rd	
Quezalpa ..	Cerro to the N. of Cojutepeque	Do. ..	12	3rd	
Rio Grande ..	Cordilleras of San Fernando	Do. ..	11	3rd	
Izalco ..	Volcan of Santa Ana ..	Pacific	11	2nd	
Sonsonate ..	Volcan of Tamagascote to Apameca	Desagüe	10	2nd	
Lanjuatú ..	Cordilleras of Metapam ..	Lake of Güija	10	3rd	
Comalapa ..	Barrancas of Chinameca ..	Pacific	9	2nd	

NOTE.—The length of the rivers is that part of their course within the State of San Salvador. The Cordilleras, which is twice intersected by the Lempa and by the Sumpul, divides itself into four ranges, that of Chalatenango, of San Fernando, of the Palma, and that of Metapam.

TABLE OF THE LAKES.

Names.	Position.	Department.	Dividing Line of Water.	Falls into	Notes.
Güija .. .. .	W.S.W. to S.W. of Metapam.	Santa Ana .. .. .	3rd	The Lempa ..	With the rivers Ostua, Languatu, and various others: lateral lakes.
Ilopango .. .. .	S.W. of Cojutepeque ..	Between La Paz, Salvador, and Cojutepeque.	2nd	The Giboa.	
Camalotal .. .. .	S.E. of the Volcano of San Miguel.	San Miguel .. .. .	2nd	The Pacific ..	With a river.
Zapotitan .. .. .	W. of the Volcano of San Salvador.	San Salvador .. .. .	3rd	By River Sucio into the Lempa.	
Cnatepeque .. .. .	Declivity of the Volcano of Santa Ana.	Santa Ana .. .. .	3rd	No outlet .. ..	With a rivulet.
Chalchuapa .. .. .	N.E. of Chalchuapa ..	Ditto .. .. .	2nd	River Paz .. ..	With many rivulets.
Apastepeque .. .. .	N.E. of Apastepeque ..	San Vincent .. .. .	3rd	Lempa.	
Cuscatlan .. .. .	W. of Cuscatlan .. ..	San Salvador .. .. .	3rd	No outlet.	
Laguna .. .. .	S.S.E. of Mount Redondo	Chalatenango .. .. .	3rd	Ditto.	
[In the Crater or the Volcanoes' sides.]	S.E. of Chinameca ..	San Miguel .. .. .	3rd.		
Chinameca .. .. .	S. of Tecapa .. .. .	.. .. .	2nd.		
Tecapa .. .. .	N. of New San Salvador.	San Salvador .. .. .	3rd.		
San Salvador .. .. .	S. 15° W. of Santana ..	Santana .. .. .	2nd.		
Santa Ana.					
San Juan de Dios ..	N. of Apaneca .. .. .	Sonsonate .. .. .	2nd.		
Apaneca .. .. .	S. of ditto .. .. .	Sonsonate .. .. .	2nd.		
Lajunita .. .. .	N.W. of ditto .. .. .	Sonsonate & Santa Ana	2nd.		



formed, must have assisted their gigantic brethren in their Herculean labours. But the soil between those smaller volcanoes, as in some of the peaks and elevated plains, shows the natural result of time, together with the precipitation and descent of the waters from the mountains, and the conversion of ashes and stone with earth or humus, becoming thus transformed into alluvium. In this middle ground it is difficult to trace the line of separation between the waters flowing in opposite directions, offering rather to the view a confused assemblage of high peaks and deep ravines, mountains, valleys, and plains, without any regular formation, all showing the terrible action of these ancient volcanoes, intercepted, separated, and mixed in such a manner as to render a close inspection a very difficult undertaking. The upper chain of the Cordilleras does not form any continuous range, but rather appears in groups, connected by immense declivities or spurs of isolated groups, each one rising higher than another. The first group comes from the east, being formed by the volcanoes of Sociedad and Cacaquatique, the spurs from which intercept the Lempa; the soil of this part of the range is almost entirely volcanic with a little alluvium. The descent of the side of the Sociedad towards the south is very abrupt, while that towards the north is very gentle, being exactly the reverse of the volcano of Cacaquatique. After these come the group of heights, of no very great elevation, of the Sensuntepeque and Ilobasco, separated by the rivers Lempa, Titiguapa, and Queralapa from all the other mountains. The dividing line of the waters alone forms a union between the Titiguapa and Queralapa (3rd class), with the middle ground, through which passes the high road from Ilobasco to Cojutepeque.

The third and the largest of this group commences from the mouth of the river Sumpul in the Lempa, and extends a little farther south than the point at which this latter enters the State of San Salvador. At this point there are formed two prolongations: the one passes towards the north (Honduras), and the other to the s.w. The highest peaks of this group are towards the n. of Quetzaltepeque (department of Chalatenango) and Chalatenango, lessening somewhat near the town of Laguna (department of Chalatenango); and again ascends as far as the mountains of Palma (department of Chalatenango). Of this group the eastern part is almost entirely volcanic, while to the w. it is more of alluvium or transformation. The more western group begins on the right branch of the river Lempa near Citalá, and terminates in the frontier river Languiatu; its elevation is almost equal to that of Palma, and the soil that of transformation. The inferior chain of volcanoes, extending from the Bay of La Union to the river Paz, presents a range of high volcanic cones, united by elevated land or smaller peaks, of transformation soil, although

of igneous origin. This chain is interrupted in its course by the channels of three large rivers—the San Miguel, the Lempa, and the Giboa ; and so forms four groups. The first consists of the volcano of Conchagua with its prolongations, which also interrupt the stream from the lake of Camolotal ; the second is formed by the volcanoes San Miguel, Chinameca, Buenapa, Usulután, Tecapa, Tabaret, and other smaller volcanoes of less importance ; the third is composed of the volcano of San Vicente with its processes, which in curves proceed to the N.E., N.W., and W. This group is equally separated from the middle territory, similar to that of the superior chain of Sensuntepeque and Ilobasco. There is only a narrow line of waterparting (3rd class) proceeding from the height of the volcano, passing by the hot spring about 15° N.W., and forming a species of bridge with the middle ground. The most extensive group of the inferior line holds a position between the rivers Giboa and Paza, leaving on one side the great volcano of San Salvador, and mountain of San Jacinto more to the N. almost isolated. This group has three deep cuts or descents ; the first near San Thomas, the second to the south of New San Salvador and Cuscutlan, and the third descent to the W. and N.W. of Guaymoco. The land of this part of the group (from the river Giboa to the W.N.W. of Guaymoco) is that of transformation, elevated by volcanic agency, and traversed by deep ravines and narrow chains of heights, which in some places descend until lost in the Pacific. To this group belong still the volcanoes of Marcilino, Santa Ana, Izalco, Naranjo, Tamagasote, Aguila, San Juan de Dios, Apaneca, and Lagunita. The prolongations from the latter reach to the river of Paza ; this part of the fourth group of the inferior chain forms almost an entire hilly volcanic territory from which arise the elevated peaks of the different fiery craters.

Between these volcanic chains and cordilleras there are naturally plain regions ; and although plains of great extent do not exist in Salvador, there are a great variety of level surfaces in the State. The plains are—that which begins at the foot of the prolongations of the volcano of Conchagua, passes the town of San Miguel, the villages of Quiclepa, Moncagua, as far as Chapiltique, which extends to the N. as far as the spurs of the volcano of Cacahuatique ; and that which between this volcano and those of Chinameca, Jucuapa, and Tecapa descends towards the left bank of the Lempa. We shall call this plain that of San Miguel—another plain along the banks of the river Paza, crossed only by a small elevation near the valley of San Antonio from the plain of Santa Ana. The plains along the Pacific are rather inclined descents of the mountains, as those near Acapiala, Jaltepeque, and Jiquilisco. The first comprehends the territory along the course of the river Sonsacate. The others are interrupted in undulations by the pro-

longations of the volcano to the N. of them. The plain which surrounds the lake of Zapotitan is more marshy, and there remains only that of Sesore (department of San Miguel), which in the banks of the river of the same name extends to the Lempa, and the plain Ocotepeque, part of which enters in the north of the State, on the banks of the Lempa near Citalá. Elevated plateaux are—the plain of Pasaquina (department of San Miguel), the Potrero, near Jucuapa (department of San Miguel), that of San Pedro and Santa Domingo (department of San Vicente), that of Sensuntepeque, besides that of San Vicente, of New Salvador, of Quezatlpeque, and of Jaguilapa, to the east of Metapam. Of plains shut in, there are only four small ones; that of Chinomeca (with Jucuapa, Buenaventura, and Guadalupe), that of Apastepeque (department of San Vicente), of Apopa (department of San Salvador), and Metapam.

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In terminating this chapter I have to offer some observations upon the lakes of Guija and Ilopango. They belong to the middle territory, but their position shows them to have been preceded by considerable elevations, of which the first formed part of the superior chain of Cordilleras, and the second of the inferior range of volcanoes. The fierce, irregular nature of the elevated region that surrounds these lakes proves that they occupy the very centre of volcanic activity in the State of San Salvador, and that after their extinction the outer crust of those volcanoes fell into the crater, gradually filling up its cavity newly formed, the water descending from the neighbouring heights converting the cavities which remained into lakes; and finally, after having filled up the depths of the crater beds, the waters ran over, forming channels through the hardened lava and elevated ground, an example of which is afforded by the stream from the Lake Guija, which for more than two leagues has had to dig for itself a channel in the lava, and has cut in so rapidly that in some places the banks have attained an elevation of from 50° to 60°. In the same manner the lake of Ilopango has mined out for itself a channel through exceeding high precipitous land, to unite with the deep flowing river of Giboa.

It is impossible to say when those stupendous operations of nature took place—certainly a long period before the conquest of America; nor is it probable the natives ever knew anything certain about it; if they did have any tradition in relation thereto, it has been lost amid the subsequent immigration and political events.

The current tradition of to-day is, that in the site of the Lake of Guija there existed a populous city, which was destroyed similar to Sodom and Gomorrah of the old world. There is nothing impossible in the story, seeing that we still find many flourishing cities at the base of volcanoes; but that the silver vases, candle-

sticks, &c. &c., said to have been found in the lake, have come from the lost city, is more than doubtful. It is more probable that, in the political tempests which have passed over these countries, some of the inhabitants may have committed their treasures for greater security to the waters of the lake, and may afterwards have perished without divulging the secret, or have been unable to find the deposit, until long after accident or avarice may have brought to light the hidden treasures.

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XIV.—*On the Latitude and Longitude of some of the principal Places in the Republic of Guatemala.* By A. VAN DE GEHUCHTE.

Communicated by JOHN POWER, Esq., of Panama, F.R.G.S.

*Read, June 14, 1858.*

SIR,—After the first exploration made by me, in the interior of the Republic, I saw that all the maps of the country were bad; and after having examined many of them attentively, I came to the conclusion that they were not the result of measurement as they ought to be, but compilations made in offices, from a mass of false data, and from notes, each more incorrect than the other. From that moment I saw that the compilation of a good map would be very useful, as well in the country as abroad, and I resolved to undertake it, not being ignorant that such a work undertaken by a single person was very difficult, and required profound study of the localities; that this study involved many journeys, and, consequently, demanded considerable outlay. This was no obstacle to me, and after eight years of assiduous labour I find myself to-day in a position to form a correct map of the entire republic of Guatemala.

If I have not published this work, it is because I want to make some further explorations in the S.E. part of the coast, which up to the present time I have not been able to accomplish.

Until I can publish my map, I take the liberty of laying before you some notes which may be interesting, requesting you to publish them in your valuable Journal.

It became at once necessary, as a base of operation, to determine the true position of the city of Guatemala. This important point was surrounded with many difficulties, because some placed it in lat.  $14^{\circ} 37'$ , others in  $14^{\circ} 35' 30''$ ; in fact, it had generally been placed in  $14^{\circ} 36'$ . Seventy-four astronomical observations made by day and night, with an excellent sextant, and with a perfect theodolite, gave me a mean of  $14^{\circ} 37' 30''$ .

Nevertheless, in view of so many contradictory opinions, it

became necessary to make sure that this latitude was the correct one; for this purpose it was requisite to establish a series of triangulations on the numerous volcanos of the republic. I commenced, therefore, by determining the true distances of the volcanos of Agua, of Fuego, and of Pacaya, with respect to Guatemala. I laid down carefully measured base lines near the city, and I found that the volcano of Pacaya was distant from the cathedral 31255 mètres; Agua, 32510 mètres; Fuego, 45010 mètres.

These points being once established, it became necessary to determine their distance from the shore of the Pacific. For this purpose I went many times to the old port of Iztapa, and measuring there a base of 11702 mètres, to the present port of San José de Guatemala, I found the distance from Iztapa to be—to volcano of Pacaya, 51800 mètres; of Agua, 60200 mètres; of Fuego, 64210 mètres; that Iztapa is south  $15^{\circ} 20'$  west of Guatemala; and that the line between these two localities, or the hypotenuse of the triangle, is 82801 mètres.

I deduce from this that the latitude of Iztapa is  $13^{\circ} 53' 53''$ , counting the length of the degrees of the meridian with a compression of  $\frac{1}{308,64}$ . The mean of more than 200 observations made by me and by various vessels has given the position as  $13^{\circ} 53' 32''$  N. lat.; my calculations give  $13^{\circ} 53' 53''$ ; a difference of very little importance.

All these triangulations have tended to confirm the correctness of my astronomical observations made in Guatemala, because, if the capital is in  $14^{\circ} 36'$ , Iztapa should be in  $13^{\circ} 52' 03''$ , a result which no observation has given: if, on the other hand, the latitude be taken at  $13^{\circ} 56' 30''$ , as some have asserted, Guatemala would be in  $14^{\circ} 40' 07''$ , in which no calculation has ever placed it. I deduce therefore from this, that the correct position of Guatemala is, undoubtedly,  $14^{\circ} 37' 30''$  N.

The determination of the longitude was a little more difficult. The mean of a large number of calculations gave me  $90^{\circ} 30' 37''$  w. of Greenwich: the position of my triangle at Iztapa, placed by the generality of calculators in  $90^{\circ} 43'$ , gave me for the capital,  $90^{\circ} 30' 47''$ , which I do not hesitate to accept as correct.

In the Gaceta of Guatemala, of 23rd of October, 1857 (sic), the Rev. Father Cornette has fixed the longitude of Guatemala in  $92^{\circ} 24' 45''$  (meridian of Paris). I do not doubt that if the solar altitudes, which had served for the correction of the watch, had been calculated on the latitude of  $14^{\circ} 37' 30''$ , instead of  $14^{\circ} 35' 30''$ , the longitude given by the Rev. Father would slightly have differed from mine.

One single operation might have led me into error, but here I made three journeys (in 1852, 1854, and 1857) on foot, measur-

ing, with the chain, the whole Pacific coast from the mouth of the river Paz to Ocoz, the mouth of the river Tilapa, a distance of more than 60 leagues. I established on the sea-beaches a great system of triangulations between all the volcanos, taking at my fancy bases of 10000, 20000, 30000, and 40000 mètres; and these operations have agreed exactly with my astronomical observations.

The altitudes of the mountains, taken trigonometrically and carefully reduced, have agreed, with but slight exceptions, with my barometrical observations.

I had most difficulty in determining the position of Quezaltenango, owing to the clouds that usually envelop the "Altos" (high lands): nevertheless, my astronomical observations and the result obtained by triangulation agree perfectly well.

I do not give you a detailed statement of the hundreds of longitudes I have determined, nor of the thousands of triangles I have reduced; I confine myself to mention, at present, the latitude and longitude of the volcanos and of the capitals of the various departments.

					Longitude W. of Greenwich.			Latitude North.		
					°	'	"	°	'	"
Volcano of Agua	..	..	..	..	90	45	07	14	26	48
" Fuego	..	..	..	..	90	53	30	14	27	25
" Pacaya	..	..	..	..	90	36	34	14	21	30
" Atitlan	..	..	..	..	91	12	47	14	34	38
" Santa Maria	..	..	..	..	91	36	34	14	46	39
" Tajumulco	..	..	..	..	92	06	07	15	09	58
" Tacaná	..	..	..	..	92	15	17	15	24	11
Guatemala (city)	..	..	..	..	90	30	47	14	37	30
La Antigua	..	..	..	..	90	44	50	14	32	58
Amatitlan	..	..	..	..	90	37	50	14	28	39
Escuintla	..	..	..	..	90	47	48	14	16	46
Chimaltenango	..	..	..	..	90	49	30	14	38	49
Sololá	..	..	..	..	91	12	14	14	46	54
Totonicapam	..	..	..	..	91	21	45	14	58	18
Quezaltenango	..	..	..	..	91	34	20	14	51	32
Güegüetenango	..	..	..	..	91	36	50	15	28	15
Chiquimula	..	..	..	..	89	32	17	14	54	10
Mazatenango	..	..	..	..	91	33	14	14	40	42
Salamá	..	..	..	..	90	24	47	15	17	10
Flores, Laguna del Peten	..	..	..	..	90	04	52	17	09	47
Iztapa	..	..	..	..	90	43	0	13	53	53
Port of San José de Guatemala	..	..	..	..	90	49	27	13	53	19
Port of San Luis, bar of the river	}				91	51	29	14	09	07
Samalá										

With the map I will publish a statistical explanation, giving the position of all the points of the Republic, the direction and distance of the roads from one point to another, the origin of each city, its population and commerce, notices of the principal rivers, of the heights of the numerous volcanos of the Republic, a section

of the country from the Pacific to the North Sea (Atlantic), the difference of level between the two seas, a section of the Republic from E. to W., showing the height of all the hills and all the cities, towns, and villages, and much other information hitherto unpublished.

I am, Sir, your very obedient servant,

A. VAN DE GEHUCHTE, *Engineer.*

XV.—*On the Fine Regions of the Trade Winds.* By THOMAS HOPKINS, M.B.M.S., Vice-President of the Manchester Literary and Philosophical Society.

*Read, June 14, 1858.*

It has been abundantly shown that there are certain elevated lands which form areas of condensation of aqueous vapour, and consequent atmospheric vacua, towards which winds, known as trade winds and monsoons, blow over wide oceans. These winds, as they approach the places of condensation, loaded with the vapour they have taken up from the water over which they have passed, become stronger, and are frequently boisterous and rainy. It has also been proved that towards these same areas other, which may be called collateral winds, that are dry, blow from cool to warm latitudes, over lands, making such lands arid in their general character, and constituting them dry countries.\* The trade winds and monsoons have also been traced backwards, over the oceans, from the areas of condensation to the parts where the winds appear to take their rise, and where fine weather is generally found.

But as these fine parts over the ocean bear a certain resemblance to the arid countries that have been pointed out, it may be worth while to advert to them again, in order more fully to understand their peculiar character, ascertain their geographical distribution, and the kind of circumstances that are associated with their movements, including the sources from which the air is supplied.

Condensation in Australasia gives birth to the trade winds of the southern tropical Pacific Ocean; and near the Australasian islands the winds are of considerable strength, and occasionally stormy. But as has been before stated, more to the E., excepting during the summer monsoons of this ocean, the same winds are milder and steady, until at last, nearer to the American continent, they breathe only as gentle zephyrs. Opposite to the Island of Juan Fernandes, in say  $32^{\circ}$  of latitude and  $90^{\circ}$  of west longitude, until the equator is approached, a steady and mild trade wind is gene-

\* See vols. xxvi. and xxvii. of the Journal of the Royal Geographical Society.

rally felt ; and from that longitude to the Marquesas Islands the increase in the strength of the wind is not great.

In the Pacific Ocean of the northern hemisphere, within the tropics, the same kind of weather is found, extending westward from say the 120th degree of longitude over nearly the whole of the northern tropic, where the ocean is not studded with islands. This includes the large space between the group of the Sandwich Islands and the equator. These two fine regions of this great ocean no doubt obtained for it the epithet of "The Pacific," and those portions well deserve the name.

The winds, though mild in their character, and at first slow in their movements, occupy a large space on the surface of the globe, and the quantity of air which passes over that space must be great. This naturally suggests an inquiry as to the source whence the air is supplied. A large mass of it could not continue to flow on the surface over the ocean from the eastern to the western side unless the eastern side was supplied with an equal quantity from some other part. In a wind the motion of the air is produced directly by gravitation operating to restore a disturbed equilibrium, and therefore the force which is in action is really to be found in the superior weight of the air at the beginning of the wind, although the existence of a comparative vacuum at its termination enables that force to put the air in motion. We have, however, yet to learn from what quarter the aerial material really comes, and the form and manner in which atmospheric pressure moves the air in the way in which it is impelled on the eastern side of the Pacific. The general idea entertained on the subject appears to be that, owing to a difference of temperature in different parts, one mass of air presses against another, and that the heavier air, acting as a prime mover, forces the lighter forward ; and this general idea seems to be associated with the commencement of the Pacific trade winds. But what proofs are there that air, either from the E. or from the S., in the lower regions of the atmosphere, primarily and by its superior weight pressed the whole mass across the southern tropical Pacific? The Cordilleras of the Andes form an impassable barrier to the flow of air on the eastern side of that ocean, and farther southward there is a general wind that blows across the whole of the ocean from New Zealand to Western Patagonia, in which latter country this wind terminates, producing there a large amount of rain. But before the place of commencement of the south-eastern tropical trade wind is reached off Juan Fernandes, there are no indications of the air being forced towards the W. by any kind of movement in the part where the trade wind is first found. On the contrary, the locality is calm, and certainly does not show by any motion the action of a prime moving force.

The same general features are presented to the view in the



Northern Pacific Ocean. As in the southern, a wind here blows across the ocean to the N. of  $35^{\circ}$  of latitude, from the W. to the E., which is from Asia to America; and then a N.W. wind blows off California towards the Isthmus of Panama. Yet near to this last named wind a calm space is found, and then a gentle N.E. trade wind begins within the northern tropic, in about the longitude of say  $110^{\circ}$  W., and it continues blowing over the northern tropic, increasing in strength as it proceeds across the whole breadth of the ocean. Now, whence comes the supply of air to feed this N.E. trade wind, and by what disturbance or force is it primarily moved? These are questions to which no satisfactory answer can be found in meteorological works which recognise the Hadleian theory of winds, and therefore that theory may for the present be discarded from our consideration.

We have seen that in large areas of condensation of vapour there are ascending atmospheric currents, produced by the condensation, which warms and expands the air in the part, and permits it to be forced up by that which is heavier. The lighter air, thus forced to ascend to a height where it is subjected to less incumbent pressure, must expand and cool in the higher regions; and the process of condensation being continued by this cooling, the ascension and expansion of the air must also continue, until the whole of the movements of the air resolve themselves into an expansion and overflow of light air in the higher regions, and a pressing and rushing in of heavier air in the lower where the trade wind is blowing. The extent of both the upper and the lower currents will depend on the amount of vapour condensed in the part, and the interference of other areas of condensation with them. In the lower regions of the Pacific the air presses at first gently from the E. towards the W., and in the higher regions, having been warmed by condensation of vapour, it must expand and may flow back from the W. to the E., possibly to that part where the trade wind begins. Admitting this, we must have in the southern tropical Pacific an ascending atmospheric current on the western side, and a descending current on the eastern side, the former concentrated and energetic in its action proportioned to the amount of vapour condensed within a limited space, and the latter diffused and mild, because its descent takes place gradually over a large area, but the latter current having a constant tendency to correct the disturbance made by the former, and to restore the natural equilibrium of atmospheric pressure. It is not, however, necessary to suppose that all the air which ascends at one end of a trade wind passes through the higher regions to the other end, where the lower wind is first felt near the surface, seeing that some parts of the upper current, might successively descend and mix with the higher portions of the lower, the remaining part alone of the upper current reaching the extreme end of the line, or flat elongated

circle of the two winds. The form of the movements would be determined by the unequal statical pressure of the different portions of the atmosphere, and the shape and elevation of the comparative vacua that are created by condensation ; but an equilibrium would be soon established, and the air would remain at rest, if for a short time vacua ceased to be formed.

In like manner, within the northern tropic, condensation of vapour over the Philippine and other islands of the Great Archipelago must produce ascending aerial currents, which, flowing above, back towards the E., may descend to the lower regions on the eastern side of the Pacific to feed the never ceasing N. E. trade wind. It is evident that in this case, as in the other just named, the air of ascending streams cannot remain and accumulate in the elevated parts where the ascent takes place—it must flow away somewhere ; and in the absence of special information respecting it, we are at liberty to presume that it may go to feed the lower current. There is no indication of an adequate supply of air coming from any part of the lower regions off California, nor from any part nearer the equator, as has been supposed in former papers, and it may consequently be presumed to come from the upper regions, near the beginning of the trade wind. In the present state of our knowledge of this subject conclusive evidence cannot be adduced. To navigators we are indebted for what we know of these parts, and their general accounts accord with what has been here advanced. In the calmer parts, near the commencement of the trade wind, the sky is represented as being very clear, and so it must be if the air descends there from the upper regions : and the sky remains unclouded over a very large geographical space, until the air has had time to take up fresh vapour by evaporation from the sea. This dry state of the atmosphere is in accordance with the supposition that the air has recently descended from an elevation where, from lowness of temperature, much vapour cannot exist, and is therefore in its favour. It is true the trade winds, when first observed, appear to move obliquely, inclining a little from colder to warmer latitudes, and approaching each other at their terminations ; but their passage in the lower regions from still colder latitudes cannot be traced in this ocean, and therefore we are at liberty to presume that instead of coming from adjoining low parts, the air which feeds them may have descended from the upper regions.

The best evidence we have of the immediate source of the air in the trade winds of the Pacific is to be found in its degree of dryness. All accounts represent them as being at first, and to a considerable extent, accompanied by a clear sky ; but I have met with no register of the humidity of the air. The researches that are now in progress, by Americans as well as English, to improve our knowledge of nautical geography, will probably give fresh in-

formation; but it is particularly desirable that there should be registrations of the wet and of the dry bulb thermometers in the parts treated of. If we were in possession of such registrations over a few lines of the Pacific from E. to W., a fair inference might no doubt be arrived at respecting the sources of the great masses of air which constitute the trade winds of this ocean.

The following are extracts giving an account of the state of the atmosphere in the eastern part of the Pacific, and will probably be thought sufficient for the present. The author of 'Two Years before the Mast' says, when off Juan Fernandes:—

"At the close of the watch a few trade-wind clouds shut the island out from our view, and the next day (Nov. 27) we were out of sight of land. We caught the S.E. trades, and ran before them for nearly three weeks without so much as altering a sail."

Melville in his account of the Marquesas Islands in page 8 says:—

"The light winds were sweeping up towards the islands: all that we had to do was to square the yards, and keep the vessel before the breeze. The sky presented a clear expanse of the most delicate blue; but the most impressive feature of the scene was the almost unbroken silence that reigned."

Darwin writes, p. 480:—

"Oct. 20.—Sailed from the Galapagos, and in the course of a few days got out of the gloomy and clouded region which extends during the winter from the coast of South America. We then enjoyed bright and clear weather while running pleasantly along at the rate of 150 or 160 miles a day before a steady trade wind. The distance to Tahiti is 3200 miles."

Simpson, in his 'Journey round the World,' when in the Northern Pacific says:—

"We soon lost sight of California, while a fine breeze from the N.W. carried us in three or four days into the region of the N.E. trades. On catching these in the latitude of  $27^{\circ}$  we were in about longitude  $118^{\circ}$ . As our port, Honolulu, was only  $6^{\circ}$  to the S. of us, and  $40^{\circ}$  of longitude from us, we steered W.S.W. under all our canvas on a voyage of fully 2300 miles. During the twelve days of our run, our breeze, though it ranged from N.E. to E.S.E., was yet uniformly fair, and so equable that we never took in either studding or sky sail during the whole of our course. Our rate of sailing varied from 6 to 11 knots an hour."—p. 413.

Over the Atlantic Ocean we find similar phenomena, in kind, if not in extent, to those in the Pacific, allowing for certain known differences in the localities. Navigators who pass the Cape of Good Hope by the usual route in the Southern Atlantic towards the equator, speak of the fine weather they uniformly have when they enter the S.E. trade wind. As in the Pacific the weather continues fine as the equator is approached, but being disturbed by the Island of St. Helena, and gradually losing its clear character near the Brazilian coast. Here also registrations of the dew-point and the temperature, or what would be better, of wet and dry thermometers, would enable the inquirer to infer what

was taking place in the atmosphere where the wind arose. Ascended air with little vapour in it may possibly be supplied from the area of condensation in America, where this wind terminates ; but a knowledge of the hygrometrical state of the air in the district around would enable persons to judge whether descent may or may not be safely inferred.

In passing from Madeira and the Canary Islands towards the Caribbean Sea, the same kind of clear skies is generally found near the commencement of the N.E. Atlantic trade-wind, where we fortunately have some accounts of the dryness of the air. General Sabine at one time found that while the temperature of the air was  $66^{\circ}$ , the dew-point was only  $37.5$ . This dryness has been attributed to the neighbourhood of the great African desert, and the dust that has been long observed to fall on the decks of ships traversing the eastern part of this wind was formerly supposed to come from the desert. But recently samples of this dust have been subjected to careful examination by Ehrenberg, and by him it has been found to consist in a considerable degree of very thin and minute shells, which it is presumed may have been brought from South America, as in the soil of that country alone are some of these shells met with. It is, however, evident that the shells could not have been borne through the atmosphere from South America unless a current of air flowed in the higher regions across that part of the ocean. If therefore we are to credit the various accounts given of this shell-dust, we are constrained to admit that an upper current flows over the northern tropical Atlantic from America towards Africa, and of course in an opposite direction to the trade wind below : and as the dust falls the most freely in and near to the part where this trade wind begins to blow, we may admit that the upper wind descends there. This would account for the dryness of the air in this part without obliging us to suppose that it had come from the African desert, for which little countenance is given by known facts. It has been often observed that clouds in the higher regions passed over the Caribbean Sea in an opposite direction to the trade winds ; but although those clouds travelled eastward towards Africa, the prevalence of the Hadleian theory caused them to be supposed to be passing to the N., whereas they may be presumed to have flowed in the same current that conveyed the dust.

Mr. C. Darwin, when at St. Jago, Cape de Verde Islands, at one time found the dew-point  $29.6$  below the temperature. But he also says that :

“ Generally the atmosphere is hazy, and this is caused by the falling of impalpably fine dust. The morning before we anchored at Porto Praya I collected a little packet of this brown-coloured fine dust. Mr. Lyell has also given four packets of dust which fell on a vessel a few hundred miles northward of these islands. Professor Ehrenberg finds that this dust consists in great part of infusoria with siliceous shields, and of the silicious tissue of plants.

The infusoria, with the exception of two marine species, are all inhabitants of fresh water. From the direction of the wind, wherever it has fallen, and from its always having fallen during those months when the Harmatan is known to raise clouds of dust high into the atmosphere, we may feel assured that it all comes from Africa. It is, however, a very singular fact, that although Professor Ehrenberg knows many species of infusoria peculiar to Africa, he finds none of those in the dust which I sent him; on the other hand he finds in it two species which hitherto he knows as living only in South America. The dust falls in such quantities that vessels have run on shore owing to the obscurity of the atmosphere. It has often fallen on ships when several hundred and even more than 1000 miles from the coast of Africa, and at points 1600 miles distant in a N. and S. direction."—p. 193.

I have shown that there are no strong ascending currents to be traced over the great African desert. The Harmatan blows from it during our winter months when tornadoes take place over the equatorial Atlantic, and towards these tornadoes the Harmatan blows as a lower wind. But it is at the same season that the valley of the Orinoco is dry; and the strong winds that then sweep over that valley evidently go to the Southern Andes, at the time when much vapour is condensed there, and strong ascending currents are thereby created; in some of which, or in others in contact with them, the dust may be carried up, and afterwards borne across the Atlantic. In the higher regions this wind would blow from the W.; but if any of it should descend, and press into the trade wind below, in any part of its course, it would become a descending feeder to that trade wind, turning back and becoming a part of it: and near the beginning of the trade this descended current would in the lower regions seem to come from the African desert.

Lieutenant Maury appears to conclude, with confidence, that the Atlantic dust comes from South America, and he states facts which indicate that some of it, at times, proceeds over Africa as far as Germany, where it has been collected and examined. Visitors to the lofty Canary Islands have noticed that a wind above was often blowing in a contrary direction to the trade wind below. From the researches now making over the regions of the ocean we may hope to obtain more information on this subject, and it is evidently desirable that we should be informed whether the dust falls equally at all times of the year, or whether the great showers of it take place only when the valley of the Orinoco, where the shells are found, is dry and windy.

From the various phenomena that accompany the commencement of the four trade winds of the Pacific and Atlantic Oceans which we have been examining, and the circumstances that surround them, there are then reasons for inferring that atmospheric currents pass through the higher regions in a direction contrary to the trade winds below; and that some of the air in these upper currents, having had much of its vapour condensed where it ascended by the cold due to the elevation, at last comes down as

a dry wind in those localities near the beginnings of the trade winds, which are so free from rain or clouds.

In the Indian Ocean near the equator constant trade winds, such as those of the Pacific and Atlantic, are not found, and accordingly there are no localities remarkable for having constant fine weather, such as that which has been just adverted to. But the monsoons of the Indian Ocean present similar features to the trade winds of the Pacific and Atlantic, though not alike in all respects. The south-west monsoon begins to blow over the ocean, and near to its commencement the locality is distinguished for having a season of fine weather. Incidental allusions to this fact may be met with in accounts of navigators who pass from India after having crossed the equator to go towards the Cape of Good Hope. But it is particularly asserted that in the northern part of the Mozambique Channel the season of the south-west monsoon is the fine season; and from this part proceeding across the ocean to Hindustan, the sky becomes less clear as the aerial current approaches India, where it becomes the wet and stormy south-west monsoon.

But if the air found in the Mozambique Channel descends there from the upper regions, whence does it come? Had it been carried up in ascending currents over the Malabar hills, or the more distant Himalaya mountains, and passed in upper regions across the Indian Ocean to the Mozambique Channel? No known facts warrant this supposition. It is not, however, necessary that we should presume that the air which descends in a fine locality has come from the terminus of the same wind that it feeds. There are other areas of condensation in the neighbourhood, as at the Cape of Good Hope, over the large Islands of Madagascar and the Mauritius, from which dried air may possibly descend to feed the south-west monsoon. The proposition is, that air which has been dried by condensation of some of its vapour in high regions descends in some other parts to the lower regions as dry air, making the locality fine; but it does not follow that it must descend to feed the same stream that had furnished it. Whether it does or does not, will depend on local position and statical pressure, the ascended air flowing in the upper regions perhaps towards the nearest wind to feed it, rather than towards that from which it had ascended. In the present state of our knowledge the immediate source of the air that constitutes the commencement of the south-west monsoon must be considered unknown, and we must rely on analogy alone in conjectures respecting it.

The *north-west* monsoon, in the earlier part of its course, is found over land, as over Persia, the desert of Bokhara and Central Asia, all of which countries are dry. If it consists of recently descended air, it would seem to have come from many small areas of condensation distributed over the mountains of Asia and Europe: the

passage of the air from colder to warmer latitudes would, however, tend to make it dry. Arabia and much of the eastern coast of Africa, and the seas adjoining, have nearly cloudless skies, but beyond this fact we know little of the atmosphere in this part of the world. The *Himálaya* mountains and the East Indian Archipelago are the two great areas of condensation of vapour in the neighbourhood of the Indian Ocean, and reasoning from the general principles here recognised, we must infer that large quantities of air, within these areas, are borne to high regions, and in some parts come down to low ones, but as to where they descend we have no clear indications.

Of the higher regions of the aerial ocean we have indeed little knowledge, excepting among mountains, where the air is often disturbed by local causes; but that which is borne aloft does not produce dense clouds after it has been deprived of its vapour, and the heat which is liberated when rain is produced is left to expand the upper air, having little vapour, and this expanded air with its small portion of vapour is soon diffused in the higher regions where dense clouds do not originate. Those light ones that are seen at great elevations over large plains or extensive oceans, being at a great distance, appear to move slowly, and the movements have been but little noticed. The higher regions have received little attention from meteorologists; we are therefore left to infer as well as we can, from a few facts, what is generally taking place in those regions. The striking circumstance, that very large masses of air flow unceasingly near the surface of the globe, over wide extents of land and sea to certain parts where they evidently ascend to the higher regions, compels us to infer that these masses must in other parts descend to the lower, and we are obliged to take such indications of the places of their descent as can be discovered. But wherever they come down, whether in a neighbouring part or at a great distance, they must be dry, having been deprived of much of their vapour by cold.

In the rainy sea of the Atlantic, as well as in other localities of tornadoes and typhoons, when storms occur, large quantities of air must be borne to the higher regions to descend in other parts according to the laws of statical pressure; and a summer thunder-storm in colder latitudes, such as the British islands, will produce similar results; but there seems reason to presume that in many of such cases the air which ascends soon comes down again, as in a few hours fine weather often follows the storm,—it being commonly said that the storm clears the air, and a hygrometer shows that it has become drier.

It has been shown that there is no direct evidence that air, warmed in a belt near the equator, ascended there and overflowed towards the poles; but when it ascends continuously in one part of the tropics it must descend in some other part, and it is reason-





The English Funds have again remained throughout the day without any variation, except that towards the termination of business the market generally became more firm. Consols were first quoted 90½ to 91, and at the close there were buyers at 90½ for both money and account. India Bonds let off at 77s. to 80s., and Exchequer-Bills (June), 68s. to 69s., (March) 68s. to 71s. premium.

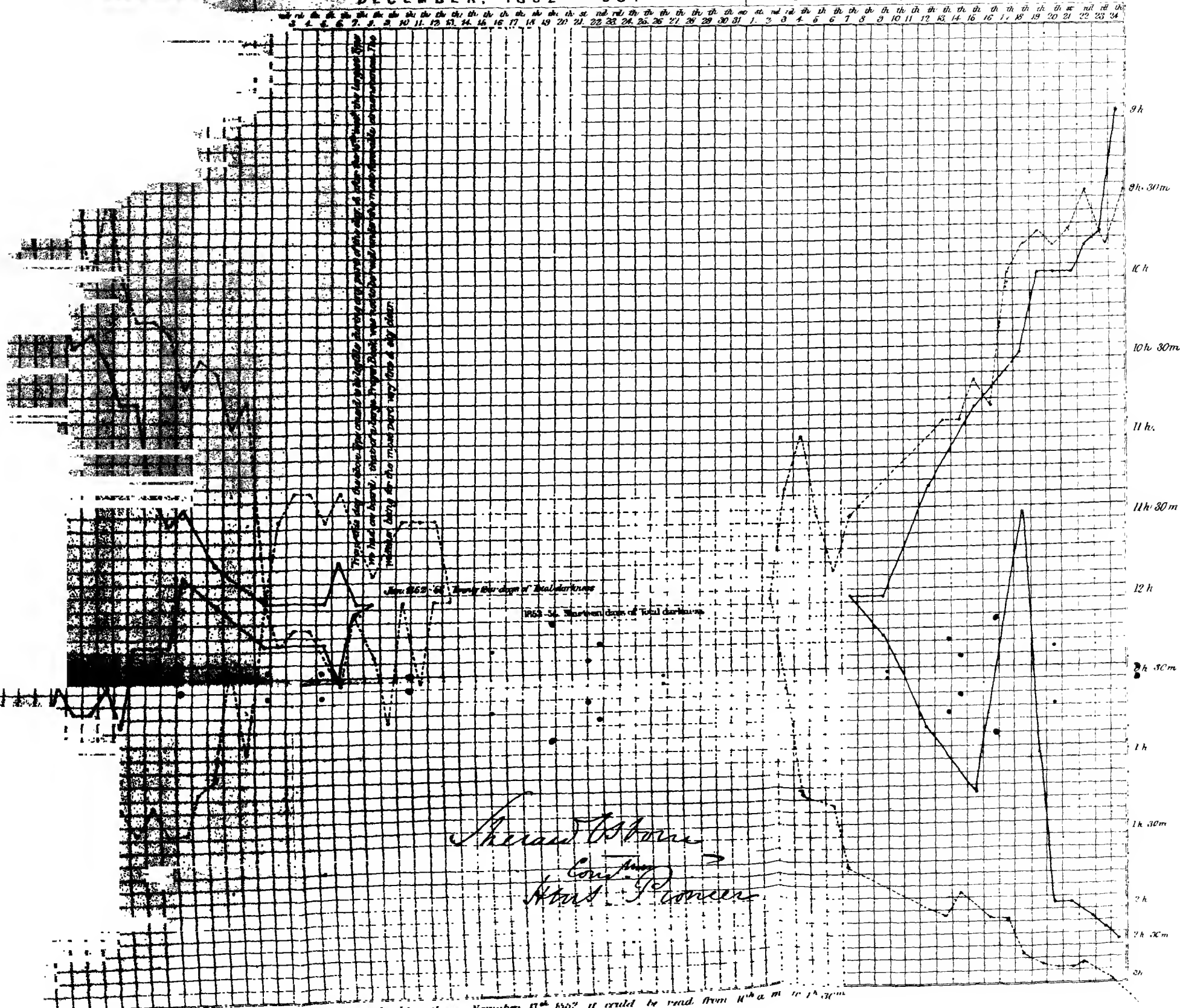
as a Standard for Light.

enced during the absence of the Sun within the Arctic Zone in the Winters of 1852-53 and 1853-54.

Lat<sup>th</sup> 76° 56' N. The lines denote the years 1853 '54 in Wellington Channel, Lat<sup>th</sup> 75° 31' N.

DECEMBER, 1852 — '53.

JANUARY, 1853 — '54.



Below Noon mark the time to which the Pipe was legible thus November 11<sup>th</sup> 1852 it could be read from 11<sup>h</sup> 30m to 1<sup>h</sup> 30m

able to presume that directly or indirectly it comes down as a feeder to winds that blow with equal constancy.

There certainly are winds that blow overland from polar towards tropical regions, but the tropical air that feeds the principal of these winds, flows, not in the higher regions, but on the surface of the ocean, passing from the tropics over the low level of the sea. In the Northern Atlantic southern winds blow between Ireland and Norway on the E., and Labrador and Greenland on the W., far into the Arctic Ocean, in their course parting with much vapour; and in the Northern Pacific western winds go far N. on the American coast, furnishing rain and snow. But these masses of air appear to return over continental lands, in both the old and new worlds, to regions of condensation in warm and moist parts. In the southern hemisphere winds blow eastward over the sea from the cold regions of Victoria Land to the rainy district about Cape Horn; but to the W. of Victoria Land, extending beyond the meridian of the Cape of Good Hope, the flow of air in the lower regions is represented by navigators as being towards the South Pole.

Condensation of vapour, by irregularly disturbing the atmosphere at various heights, puts the air in motion at those heights, making it ascend in one part, and it must come down in another. Some of the areas of ascension have been described, and a few of descent, but there are innumerable others spread over the surface of the globe, every hill or place where heavy rain falls being to some extent an area of ascent, with the wind that blows towards it coming directly or indirectly from a region of descent. The whole aerial ocean, to a considerable height, is thus kept in a state of motion and change; and the invisible elastic vapour which is sent into the atmosphere by evaporation in one part, comes down as rain in another. The different quantities of vapour condensed in equal times in different localities, and the elevations at which the condensation takes place, modify the movements of the air in various degrees, and in all conceivable ways, but the nature of the processes is always the same.

XVI.—*Remarks upon the Amount of Light experienced in high Northern Latitudes during the absence of the Sun.* By Captain SHERARD OSBORN, R.N., C.B., F.R.G.S., Officier Légion d'Honneur, etc.

*Real, June 14, 1858.*

AFTER passing the winter of 1850-51 in H.M.S. *Pioneer* under the lee of Suffolk Island, in latitude 74½° N., I observed that discussions often arose as to the amount of light we Arctic navigators had really enjoyed during the past season of darkness, and that in

England a vast amount of misconception existed as to what was the state of things in those latitudes during so prolonged an absence of the sun.

On my return to the Arctic Regions in 1852, I made arrangements not only for a most correct and impartial registry of the state of the weather and wind, but also that a registry of the amount of light should be kept.

The standard I selected as a test of light was the "Times" newspaper, as being pretty familiar type to all English eyes, and from its "Money Market Intelligence" I cut the fragment, of which a fac-simile is attached to the annexed diagram. My object was to ascertain during how many hours daily that type was legible upon the frozen surface of the sea, clear of the ship and of all shadow. The men selected for the work were three trustworthy petty-officers, who kept regular watch both by day and night; they were gifted with good sight, but nothing out of the usual course of things; they had no theories or crotchets to support, and consequently were most faithful in their observations.

The type was always placed facing the south, whence of course came the daylight we enjoyed; and the remarks upon the state of the sky, whether clear, misty, or cloudy, were recorded by me daily. It is hardly necessary to say that after our long night commenced, the amount of daylight which reached us depended considerably on a clear state of the atmosphere; but on looking at the diagrams made by the contracting light, it will be observed that it appeared to follow some general law in the two seasons, and diminished gradually day by day from November the 1st.

In lat.  $76^{\circ} 56'$  N., that of Northumberland Sound, the standard type before referred to ceased to be legible after the 15th December during any time in the day, and it was not until the 9th of January, 1853, that it was again read during the brief space of 15 minutes.

Looking at the diagram line for 1852, we find that from the 6th November until the day of total darkness (December 15th), we in the *Pioneer* enjoyed in all 58 hours daylight, in which a person could have read the "Times" upon the open floe—or in other words, two days and ten hours daylight out of 39 Arctic winter days. The diagram for the following year, 1853, shows a slight improvement in this respect, for we there find that in latitude  $75^{\circ} 31'$  N., or Wellington Channel, rather more than a degree farther south, although the date of total darkness agreed remarkably with that of the year 1852, yet between November 6th and December 14th we had had 4 days and 17 hours light, or nearly twice as much as in Northumberland Sound.

This may at first sight appear strange, but the cause is simply this:—In Northumberland Sound we should have had much more light but for the misty state of the atmosphere, occasioned by the

weakness of the ice in our neighbourhood, and the frost-smokes in the holes of water near us—holes which have been dignified with the names of “Polynias,” or Open Arctic Seas; and but for those mists we should have had more daylight in November, although it is very probable the entire cessation of sunlight on December 15th would still have taken place. In the winter of 1852-53, in latitude  $76^{\circ} 56' N.$  it will be observed that there was no sunlight whatever for the space of twenty-four days; and in that of 1853-54, in latitude  $75^{\circ} 31' N.$ , the same darkness existed for only 19 days.

With respect to that portion of the diagrams illustrative of the increase of light as the sun approached our Arctic horizon, it will be observed that the increase of light in both seasons was far more rapid than the decrease had been.

For instance, we find in 1853 that the daylight on January the 25th was already of  $5\frac{1}{2}$  hours duration. The declination of the sun would on that day have been about equal to what it was on the 19th November, 1852; but on that day we were only blessed with 2 hours 15 minutes daylight.

The corresponding 25th of January, 1854, in a more southern latitude, we had nearly six hours light; and on the corresponding day of the previous autumn, November 19th, 1853, only 4 hours 5 minutes of sunlight.

This rapid increase of the daylight in the spring of the Arctic regions is, in my opinion, owing to the absence of fogs, clouds, or mists at that season of the year. The rays of light are not impeded in their passage to the earth, and possibly the vast dome of snow and ice which at that season covers the Arctic zone serves to reflect and promote the diffusion of light: whereas in the autumn a totally different state exists; fogs, frost smokes, falling snow, and cloudy skies then prevail, and it is only wonderful that in  $76^{\circ} 56' N.$  we should find any sunlight whatever fifty-three days after the sun has ceased to be visible.

The revivifying effects of returning light are most beneficial to both the animal and vegetable kingdom after the sore trial to which they have both been put during the period of total darkness and intense frost; and the rapid return of light to them cannot but be looked upon as another instance of the beneficent care of the Almighty for the work of his hands.

For farther details, I would refer the curious to the register attached to the diagram; and as it is the first attempt that has been made to place in a simple manner before the public the decrease and increase of light in the Arctic regions, I am in hopes it will be found in some measure interesting and instructive to the Society.

H.M.S.S. *Pioneer*.—Register of the amount of Daylight in Northumberland Sound during the absence of the Sun in the Winter of 1852-53.

Specimen of the Type  
used as a  
Standard for Light.

The English funds have again remained throughout the day without any variation, except that towards the termination of business the market generally became more firm. Consols were first quoted 98½ to 99, and at the close there were buyers at 98½ for both money and account. India Bonds left off at 77s. to 80s., and Exchequer-bills (June), 66s. to 69s. (March), 68s. to 71s. premium.

Latitude 70° 56' N., Longitude 97°.

Position.	Date.	Period during which the above Type was legible.			Daily		Wind and Weather.		Remarks.
		A.M.	P.M.	Total.	Decrease.	Increase.	Direction.	Force, &c.	
<b>1852.</b>									
	Oct. 27	{ The Sun was visible, owing to refraction; it was <i>actually</i> at noon below our horizon.							
		From	To						
		h. m.	h. m.	h. m.	Min.	Min.			
Nov. 6		9 0	2 10	5 10	..	..	Calm.	0, misty.	Heavy S.E. gale on 10th and 11th inst.
Nov. 7		9 10	2 15	5 5	5	..	N.E.	3, misty.	
Nov. 8		9 15	2 0	4 45	20	..	N. by E.	1, cloudy.	
Nov. 9		9 0	2 0	5 0	..	15	N.W.	2, clear.	
Nov. 12		9 45	1 30	3 45	75	..	S.E.	6, misty.	
Nov. 13		10 0	1 30	3 30	15	..	S.E.	4, misty.	
Nov. 14		10 30	1 30	3 0	40	..	S.E.	2, overcast.	
Nov. 15		9 45	2 20	4 35	..	..	{ A very clear day, with a peculiar reflection of light from the snow.		
Nov. 16		9 30	1 0	3 30	..	..	S.E.	3, misty.	
Nov. 17		10 15	1 0	2 45	45	..	S.E.	5, overcast.	
Nov. 18		10 0	0 30	2 30	15	..	S.E.	3, ..	
Nov. 19		10 25	0 40	2 15	15	..	E.S.E.	1, ..	
Nov. 20		10 20	0 40	2 20	..	5	S.E.	3, misty.	
Nov. 21		10 30	0 30	2 0	20	..	S.E.	6, overcast.	
Nov. 22		10 45	0 45	2 0	0	0	S.E.	6, misty.	
Nov. 23		10 45	0 15	1 30	30	..	S.E.	2.	{ The day was slightly cloudy, but the light was not interrupted by clouds.
Nov. 24		11 20	0 15	0 55	35	..	N.W.	3, misty.	
Nov. 25		11 30	0 15	0 45	10	..	N.W.	1, ..	
Nov. 26		{ 11 25 } { 11 50 }	..	0 30	15	..	E.S.E.	overcast.	
Nov. 27		Too dark to read.			..	..	East.	1, misty.	
Nov. 28		Paper legible for 15'.			15	..	N.E.	4, clear.	
Nov. 29		Paper not legible.			..	..	N.W.	4, misty.	
Nov. 30		Ditto.			..	..	..	..	
Dec. 1		.. { 12 0 } .. { 0 15 }	0 15	0	0	0	W.N.W.	3, misty.	
Dec. 2		and 3rd and 4th not legible.			..	..	E.N.E.	1, very clear	
Dec. 5		12 0	0 15	0 15	0	0	Calm.	Very clear.	{ Qu. whether light was not auroral? (Vide Log.)
Dec. 6		11 45	0 30	0 45	..	30	Calm.	Very clear.	
Dec. 7		{ From this day the above type ceased to be legible during any part of the day; and after the 15th inst. the largest type we had on board, viz. that of a large Prayer Book, was not to be read under the most favourable circumstances, the weather being for the most part very fine and sky clear.							
<b>1853.</b>									
Jan. 9		12 0	0 15	0 15	0	15	S.E.	2, misty.	
Jan. 12		11 20	0 45	1 25	..	70	Variable.	1, clear.	
Jan. 15		10 50	1 15	2 25	..	60	E.N.E.	1, very clear.	
Jan. 18		{ 10 30 } { 11 30 }	..	1 0	85	..	..	..	
Jan. 19		10 0	1 0	3 0	..	120	..	Very clear.	
Jan. 20		10 0	2 0	4 0	..	60	..	Very clear.	
Jan. 21		10 0	2 0	4 0	..	0	..	..	
Jan. 22		9 50	2 10	4 20	..	20	..	3, misty.	
Jan. 23		9 45	2 15	4 30	..	10	..	Hazy.	
Jan. 25		9 0	2 30	5 30	..	60	..	6, misty.	
Ceased to register.—Vide Log for the day.									

H.M.S.S. *Pioneer*.—Daily Register of the amount of Light during the absence of the Sun, in the Winter of 1853-54, the vessel being frozen in between Capes Osborn and Eden, on the eastern shore of Wellington Channel.

Position.	Date.	Period during which the above Type was legible.			Daily		Wind and Weather.		Remarks.
		A.M.	P.M.	Total.	Decrease.	Increase.	Direction.	Force, &c.	
In Wellington Channel—Latitude 75° 31' 13" N., and Longitude 92° 21' 55" W.	1853.	h. m.	h. m.	h. m.	Min.	Min.	True.		
	Nov. 2	8 0	3 45	7 45	..	..	N.E.	4, misty.	
	Nov. 3	8 15	3 40	7 25	20	..	North.	1, cloudy.	
	Nov. 4	8 15	3 15	7 0	25	..	North.	1, misty.	
	Nov. 5	8 30	3 0	6 30	30	..	Calm.	Very hazy.	
	Nov. 6	8 30	3 0	6 30	0	..	N.W.	1, b. c.*	
	Nov. 7	8 50	2 50	6 0	30	..	Easterly.	1, b. c. v.	
	Nov. 8	8 20	2 50	6 30	..	30	E.S.E.	1, cloudy.	
	Nov. 9	8 30	2 50	6 20	10	..	Calm.	4, overcast.	
	Nov. 10	9 0	2 30	5 30	50	..	Westerly.	3, gloomy.	
	Nov. 11	9 0	2 25	5 25	5	..	Southerly	4, overcast.	
	Nov. 12	8 55	2 5	5 10	15	..	S.E.	2, cloudy.	
	Nov. 13	8 50	1 50	5 0	10	..	S.E.	1, clear.	
	Nov. 14	8 55	2 10	5 15	..	15	N.N.E.	1, clear.	
	Nov. 15	9 15	2 5	4 50	25	..	S.E.	1, clear.	
	Nov. 16	9 15	2 0	4 45	5	..	Calm.	1, b. c.	
	Nov. 17	9 22	1 45	4 23	22	..	N.W.	2, overcast.	
	Nov. 18	9 30	1 20	3 50	33	..	S.S.W.	2, cloudy.	
	Nov. 19	9 20	1 25	4 5	..	15	S.S.W.	3, b. c.	
	Nov. 20	10 0	1 15	3 15	50	..	S.S.W.	6, snowing.	
	Nov. 21	9 30	1 15	3 45	..	30	S.E. by S.	4, misty.	
	Nov. 22	10 0	1 15	3 15	30	..	E.S.E.	3, b. c.	{ Stars of the 1st and 2nd magnitude visible at noon.
	Nov. 23	10 15	1 25	3 10	5	..	S.E.	1, clear.	
	Nov. 24	10 15	1 15	3 0	10	..	E.S.E.	1, b.	
	Nov. 25	10 20	1 25	3 5	..	5	Calm.	0, clear.	
	Nov. 26	10 40	1 25	2 45	20	..	N.W.	1, b.	
	Nov. 27	10 30	1 10	2 40	5	..	N.W.	1, cloudy.	
	Nov. 28	10 35	1 5	2 30	10	..	S.E.	1, clear.	
	Nov. 29	10 55	0 20	1 25	65	..	S.W. by S.	3, overcast.	
	Nov. 30	10 45	0 55	2 5	..	40	Calm.	Clear.	
	Dec. 1	Able to read at noon only—snowing slightly.				..	N.W.	1, misty.	
	Dec. 2	11 30	0 15	0 45	60	..	South.	1, b. m.	
	Dec. 3	11 20	0 10	0 50	..	10	S.E.	2, clear.	
	Dec. 4	11 20	0 10	0 50	0	0	S.E.	1, clear.	
	Dec. 5	11 30	0 15	0 45	5	..	S.E.	1, clear.	
	Dec. 6	11 20	0 30	1 10	..	25	West.	1, b. m.	I think auroral light.
	Dec. 7	11 35	0 10	0 35	35	..	Calm.	b. m.	
	Dec. 8	11 50	0 20	0 30	5	..	S.E. by E.	5, clear.	
	Dec. 9	11 40	0 45	1 5	0	35	Calm.	Very clear.	
	Dec. 10	11 30	0 0	0 30	35	..	S.E. by E.	3, v. clear.	{ The daily decrease during the past week has been 2' 8"; weather v. clear.
	Dec. 11	11 30	0 30	1 0	..	25	S. by W.	1, v. clear.	
	Dec. 12	0 0	0 0	..	..	..	S.E.	1, misty.	
	Dec. 13	11 30	0 0	0 30	30	..	S.W.	1, misty.	
	Dec. 14	Too dark to read at noon.							
	Dec. 15	..							
	Dec. 16	..							
	Dec. 17	..							
	Dec. 18	..							
	Dec. 19	..							
	Dec. 20	..							
	Dec. 21	Very clear sky during these three days, but unable to read any type.							
	Dec. 22	Sunday.							
Dec. 23	..								
Dec. 24	..								
Dec. 25	..								
Dec. 26	..								
Dec. 27	..								
Dec. 28	..								
Dec. 29	..								
Dec. 30	..								
Dec. 31	..								
1854.									
Jan. 3	11 20	12 30	1 10	..	70	S.E.	1, very clear.		
Jan. 4	11 0	1 15	2 15	..	65	S.E.	1, ditto.		
Jan. 5	11 30	0 0	0 30	35	..	S.E.	1, "		
Jan. 6	11 50	1 20	1 30	..	60	Calm.	Clear.	Snowing after noon.	
Jan. 7	11 30	1 45	2 15	..	45	S.E.	2, clear.		
Jan. 13	10 55	2 10	3 20	..	65	S.E.	2, b.	{ Six days elapsed in the interval.	
Jan. 14	10 55	1 55	3 50	20	..	Calm.	Misty.	Full moon.	
Jan. 15	10 40	2 5	3 25	..	25	S.E.	1, misty.		
Jan. 16	10 50	2 10	3 20	5	..	E.S.E.	1, misty.		
Jan. 17	10 0	2 15	4 15	..	40	S.S.W.	1, fair.		
Jan. 18	9 50	2 45	4 55	..	40	S.E.	1, v. clear.		
Jan. 19	9 45	2 50	5 5	..	10	S.E.	1, clear.		
Jan. 20	9 50	2 55	5 5	0	0	Calm.	Clear.		
Jan. 21	9 45	2 55	5 25	..	5	Calm.	Misty.		
Jan. 22	9 30	2 50	5 10	..	10	S.S.W.	3, cloudy.		
Jan. 23	9 50	3 0	5 10	10	..	N.W.	3, overcast.		
Jan. 24	9 30	3 15	5 45	..	35	N.N.W.	4, clear.		
Jan. 25	9 20	3 10	5 50	..	5	West.	1, misty.		
Jan. 26	9 15	3 15	6 0	..	10	N.N.W.	1, clear.		
Jan. 27	9 10	3 15	6 5	..	5	S.E.	1, clear.		

## APPENDIX.

*of the River Amúr and the adjacent Districts.* By MM. PERMIKIN, PERMIKIN, SHENURIN, VASILIEF, RADDE, USOLTZOF, PANKHIEVSKI, &c. Translated from the original Russian by Mr. MITCHELL, under the supervision of Capt. R. COLLINSON, R.N., Vice-Pica.\*

*Ed., January 11, and December 13, 1858.*

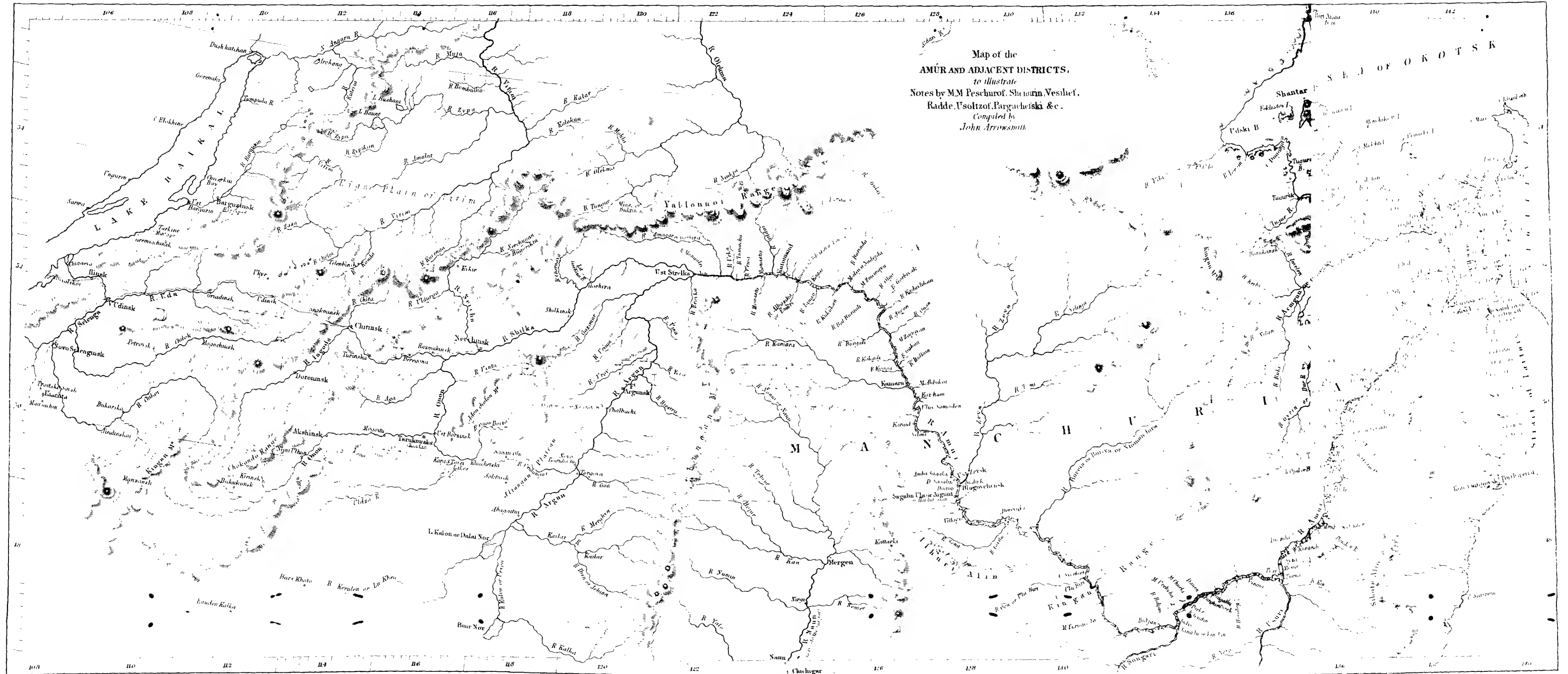
*Extent of Drainage.*—THIS, the most valuable river in Northern Asia, the only highway of nature that directly connects the central Steppes of Asia with the rest of the world, drains an extent of country from the 43rd to the 55th parallel of latitude, and from 110° to 141° E. longitude, carrying off nearly all the waters of the slopes on which the great desert Gobi, or Shamé, terminates towards the east, and after receiving a number of navigable rivers ends a winding course of 2280 miles in the Gulf of Sahalin, or Tartary.

*Boundary between the Chinese and the Russian Empires.*—The Amúr, properly so called, was wholly in the Chinese territory; the boundary line between the Russian empire, following the course of the Argun until its junction with the Schilka, then crossed to the left bank of the Amúr, and ascending the first tributary on that side below the Schilka (the Gorbiza or Kerbeche) to the Yabloñoi range, continued its course easterly along the southern slope of that range to the sea of Okhotsk, in latitude 54-14.

*Albazin.*—The fortified post of Albazin, established by the Russians on the left bank of the Amúr in 1683, was taken by assault by the Tartars in 1689, when the garrison, on account of their bravery, were taken into the service of the Chinese Emperor, a circumstance which led to the establishment of the Russian Mission at Peking.

*Treaty of 1728.*—The disputes relative to the boundary were not, however, finally arranged until the year 1728, and the reader of old voyages and travels will find in the Itinerary of the Père Gerbillon an amusing account of his journeys on these occasions, accompanied by a retinue of 2000 men, which was afterwards joined by the Amúr flotilla, numbering 100 sail, and manned by 8000 men. The terms of the treaty were dictated to the Russian envoys at Nertchinsk or Nipchu, on the Schilka, and the valley

\* See 'Proceedings' R. G. S., vol. ii. p. 153; and vol. iii. p. 92.—Ed.



Map of the  
AMUR AND ADJACENT DISTRICTS,  
to illustrate  
Notes by M.M. Peschurof, Sh. Murin, Vesilief,  
Radde, Usoltzof, Pargachevski &c.  
Compiled by  
John Arrowsmith





of the Amúr ceded to the Tartar dynasty, in whose possession it has remained until the present period, when the Russians, availing themselves of steam navigation, have entered again upon the occupation of the river, and established posts not only on both banks, but also in harbours on the seaboard of the Gulf of Tartary. Besides the natural advantages of this vast increase of territory, abounding in mineral wealth, clothed with magnificent timber, and affording millions of acres of arable and pasture land, a fluvial communication is all but established between the Baltic Sea and the Pacific Ocean.

According to Mr. Cottrell, the Schilka, with the exception of occasional rapids and shallows, in all perhaps 20 miles, is navigable to the foot of the Yabloñoi range, which here is not very elevated, and abounds in forests of oaks, with mines of iron ore, whence a road would be required to the Selenga, a navigable stream falling into the lake Baikal, whence, according to Mr. A. Palmer's calculation, 266 miles of canal and road are all that would be required to open the communication with the Baltic.

*The River Schilka.*—Four important rivers join the Schilka above its junction with the Argun: the Kara, Chernaya, Little Gorbiza, and Jeltuha. The banks of the Kara are well known by the rich gold diggings belonging to the crown. From Shilkinsk downwards, towards the Little Gorbiza, limestone of a grey colour pervades both banks, amongst which is included white marble of considerable thickness. Farther appears granitic syenite, and syenitic porphyry. The former is remarkable for including crystals of felspar; at some places the syenite has changed into diabas; then the layers change to quartz, after which appear again granite, then glimmer slate. Farther occur chlorite slate, serpentine talc slate, and then slate: the latter forms big rocks, which approach the river on the right side; they are interwoven with differently coloured veins of quartz. All the species on the left bank of the Schilka and its tributaries witness to the existence of the precious metals.

*Nertchinsk.*—The town of Nertchinsk or Nipchu contained, according to Mr. Cottrell, 20,000 inhabitants in 1841. Valuable mines of tin and quicksilver exist in its vicinity, but at present only the lead mines are worked, the produce being transmitted by Chitinsk, Udinsk, and Ilinsk, to Lake Baikal, and thence to the Russian arsenals.

Père Gerbillon reached this town on July 31st, 1689, performing the journey from Pekin in 48 days.

The Onon, a tributary rising in the Hin-Gan mountains, in latitude  $49^{\circ}$  and longitude  $110^{\circ}$ , joins the Schilka 30 miles above Nertchinsk; on it the towns of Taruknуска and Akshinsk are situated.

The Argun rises in the 48th degree of latitude and 110th degree of longitude, under the name of Kerulen, or Lu-Kheú. passes the towns of Eguden Kalka and Bars Khoto to the Lake Kalon or Dalai Nor. This region was visited (as noticed in the Address of our President, page 40) by M. Radde, in 1856; an abridged account of his researches will be found at the end of this paper.

From the lake the river assumes the name of Argun, and flowing past the town of Novo Tsuruhaituevsk, and combining with the Schilka in latitude  $53^{\circ} 19'$  and longitude  $121^{\circ} 42'$ , becomes the Amúr.

From Ust Strelka the Russians have opened a communication by means of steamboats with the sea. Previous to 1855 the ordinary communication had been maintained by barges, rafts, and boats of Manchurian construction, principally by means of the tow line. The *Lena* was the first steamer to ascend the river when it was low, and made the voyage from Nikolaefsk in 30 days; the distance, 2000 miles, would have been more speedily performed had fuel been stored on the banks of the river; thus rendering it unnecessary to stop more than a day at a time for the purpose of cutting wood, and the latter being green the vessel was constantly at half speed.

Adopting the itinerary of M. Permikin, who descended the river in 1854, we shall incorporate with it the observations of Peschurof and others, so as to afford a comprehensive description of the course of the river and its adjacent banks.

*Gorbiza, or Kerbeche, the boundary between Russia and Tartary, 1728.*—The distance from Ust Strelka to the mouth of the Great Gorbiza (Amagar) is 33 miles; generally speaking we might call the country we passed through mountainous: firstly, slate, with a layer of black colour changing into silicious slate, with quartz veins, and then shining with a dark grey colour, and irregular formation.

May 31, 43 miles from Ust Strelka\* we met on the left bank 16 Orochens (people from the Tungus tribe, who are tributary to Russia); farther on we met single Tungus in boats of birch bark; they belonged to the tribe of the Mauri, and paid a small tax to Chinese collectors: one of them spoke, besides his native tongue, Russian, Chinese, and Manchurian. Lower down from the left side two more rivers enter the Amúr, one of which seems to be of considerable width; the hills on both sides become lower, forming small meadows, in almost all of which flow brooks rich in fish, and pour into the main stream those enormous volumes of water which occasionally raise its level in two

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\* The distances throughout refer to Ust-Strelka, or Ust-Strelochni-Karaul.

or three days, 12 feet. So far the vegetation displays but a comparatively small variety; firs of all sizes, larches, elseberry, shrubs, and sand willows; and the banks here are, generally speaking, unfit for settlement, though perhaps valleys may be found suited to agricultural purposes. Slate formation still continues, but of a denser texture, and at the distance of 120 miles it is dyed by oxide of iron.

*Albazin, 158 miles.*—On the 1st of June we arrived at the place where Albazin once stood; on the right bank above, the Emuri (Albaziha) enters the Amúr; the hills lower towards this river, before the mouth of which is a low island  $\frac{1}{2}$  a mile long, on which may yet be recognized traces of the batteries erected by the Manchurs against Albazin.

The Russian fur hunters, under Poyarkof, crossing the Yabloñoi range, descended the Amúr to the sea in 1643; their success led to the foundation of the town of Albazin, and attempted occupation of Northern Manchuria, but in 1689 they were compelled to surrender their settlements to the Chinese, and a treaty was concluded at Nertchinsk, making the Gorbiza and Argun the boundary between the two empires. In consequence of disputes a second treaty was concluded in June, 1728, in which an extensive line of demarcation, separating the two countries, was defined: commencing on the west, at the river Bukterima, an affluent of the Irtysh, it extends to the sea of Okhotsk, a distance of 3000 miles, on which 87 boundary monuments were erected.

The rich pastures, and the situation protected from the northern winds, confirm the wise choice of the old Cossacks who made this place their chief settlement. The site of the town, of which nothing but the ruins now remain, could not have been better selected; it stands on a height commanding all the approaches, protected against cold winds, and in the neighbourhood of both water and wood. The river Albaziha yields much fish, which the rapidity and depth render it impossible to procure in the Amúr itself. Behind Albazin one sees for the first time another vegetation; on the southern slope of the hills the oak and black birch appear, and at the foot of the hills the hazel and elm, with the willow, ash, and wild rose, but the vegetable cover of the ground bears yet the stamp of the Dáurian flora. The country about Albazin consists of sandstone, with distinct prints of plants.

The Manegers, of whom we met here a few hamlets, looked at our passing by quite indifferently, although the steamer, with a long tow of boats, must have been to them a new sight; not even the music lured them from their occupations.

Off Albazin the numbers of the islands increase, and look more like an archipelago, giving to the Amúr a peculiar character, not favourable to navigation, but original and picturesque.

*Malaya Nadejda, 267 miles.*—The rock of Malaya Nadejda is situated below a bar (3 feet when the river is low), and, projecting into the river, was selected as the place where the steamer *Nadejda*, 8-horse power, was left on the 4th of September, 1855, and thence its name Nadejda, hope, Malaya, little. The barque, hitherto towed by the steamer, continued the voyage to Ust Strelka, reaching the place by towing in 14 days.

*Valley of Buringa.*—The valley of Buringa, 13 miles to the westward of the rock, is favourable for settlement; traces yet remain of a former Russian post Andriushkino. On the hills the white poppy, the mouse ear, and the Daurian rhododendron were in blossom. The hills consist for a great part of sandstone (coal formation) and conglomerate; in the latter are to be found slate, quartz, and hornblende inclosed in chloret cement. The river from Malaya Nadejda assumes a more southerly course.

*Toro and Angan Rivers, 354 miles.*—At 8 o'clock on the evening of June the 4th we stopped at the left bank, where one of the finest landscapes we had yet met with was seen; an open valley is encircled by the rivers Toro and Angan; on the banks the Manegers roam, and we saw droves of very fine white ponies.

Twenty-seven miles farther to the mouth of the Onon, where there are seven hamlets of Manegers: the hills, when bare, exhibited granite, with an admixture of felspar, which was coloured by oxide of iron.

*Hill Zagayan.*—We passed on the left bank the Hill Zagayan, 250 feet high, situated in a curve of the river; one of the Manegers told of a miraculous peculiarity of this hill; as soon as man approaches it it vomits smoke, but when the man retires it ceases. The river population, all of the Tunguse stock, and all given to Shamanism, pay to this hill a particular veneration, and maintain that it is the dwelling-place of an evil spirit: the mountain extends 2 miles, but could not be inspected nearer, and it can only be suggested that the smoke originates either from self-combustion of coal layers, or that the mountain contains excavations, as is the case with many lime hills in the mountainous countries of Eastern Siberia, and that by the exterior air becoming cold, the warmer air comes forth from the excavations in the shape of smoke. The hill consists of sandstone, with a black streak; at its foot are layers of conglomerate in which agates are found.

*River Bulkun, 395 miles.*—Passed the rivers Mardali, Hakan, Great Vangan, and Jagdha, arrived in the neighbourhood of the river Bulkun. This country bears another character; the wide valleys at the banks of the river enlarge, the steep hills retire, more and more, the meadows are covered with a nourishing grass, the trees appear like oases, poplars, ash, wild apple (*Pyrus spectabilis*) occur, with shrubs of red-berried elder, sand willows,

and hiss; on the hills are small oaks and black birch; larch and pine become more scarce; in these extensive valleys numerous flocks of cattle could be fed, but now life only shows itself in the powerful activity of nature. The course of the river is more to the southward, the curves are so sharp to the south-west that one appears sometimes to go backwards, and the number of islands augment.

*Kamara or Kumar Bira, 422 miles.*—In the geography of the Amúr the river Kamara occupies one of the chief positions, for during the winter the nomad tribes assemble on its banks, and here also is the most northerly of the Manchur watch-posts. It has its sources in the same mountain range from which spring the Giren and the Gan, the former of which flows into the Sungari, and the latter turns to the north-west and flows into the Argun.

The Kamara runs a considerable way, partly through mountainous, partly through level lands, and, according to the testimony of the Manegers, it has for a ten days' sail from its mouth a depth of one fathom. Rafts are floated from hence to the Chinese naval arsenal Aigunt, and the neighbourhood of the river is rich in moose deer, wild goats, sables, and squirrels.

*Ulus Samodon.*—Fifty-one miles below the mouth of the Kamara there is on the left bank of the Amúr another military post, consisting of three huts; before these, which are built of wood and covered with rush, stands a house of worship, which, according to the suggestion of the sinalogue, Sychevski (who accompanied the expedition), is an altar dedicated to the god of war. Drift coal of an inferior quality was found on the islets on the right bank.

*Amba Sahalian, 551 miles.*—The village of Amba Sahalian, on the right bank, consists of twenty-three houses; on visiting it four old men, two old women, and three young people came to meet them, all the rest of the inhabitants running away. The scattered houses are badly built of wood, rushes, and clay; instead of glass there was oiled paper in the windows. In the rooms pictures of the Buddhist gods and of the Foist were painted on linen cloth. On the walls were others also of bad Chinese workmanship, between which were cupboards for keeping household stuff. Each house has its garden, with clusters of trees, birches, elms, maple, acacia, and the incomparable *Pyrus spectabilis*; different varieties of millet and Indian corn were sown; in the smaller beds grew radishes, leeks, garlick, Spanish pepper, beans, and late greens; particular interest was excited by two new species of cabbage. Of cattle and horses few were seen, but many swine of a peculiar kind, and fowls.

*The River Zeya, 571 miles.*—The Zeya enters from the left side of the Amúr with a gigantic mouth; Mr. Permikin is very much

struck with the beauty of the country here; looking towards the right bank of the Amúr, it appeared as if the valley extended to the middle of Manchuria.

If the country of the Albazin, the mouths of the Kamara and Argun, are fit for settlements for various reasons, the valley of the Zeya surpasses them in every respect. The Russians discovered the Upper Zeya in the seventeenth century, passing from the river Tugur over the Hin-Gan, they then occupied gradually the whole valley to the Amúr, a distance of more than 650 miles, and established 4 ostrogs, or block-houses, Verkhnezeisk, Selebinsk, Giluisk, and Dolonsk.

According to an account from the year 1681, iron ore is said to be found in the White Mountains, half way between the mouth of the Zeya and its tributary the Selindja.

At the mouth of the Zeya is the Chinese post of Budink, and upon the opposite shore of the Amúr the village of Dagigo.

*Sahalin-Ula-Hoton, or Aigunt.*—Twenty miles from the mouth of the Zeya, and upon the right bank of the river, the town of Sahalin-Ula-Hoton, or Aigunt, is situated; on the whole tract towards this town small villages are situated with well cultivated fields. Both banks of the Amúr are of slimy sand, in which occur agates and cornelians. The Russians have founded the town of Blagoveschensk at the mouth of the Zeya, and this city, by a recent ordinance of the Emperor, is declared the seat of government.

It is a small place, surrounded with palisades, with a citadel and a few mud cottages, which, however, are symmetrically enough arranged. Northwards from the town, on the bank of the river, are some long sheds, and in their neighbourhood the Chinese fleet is anchored or drawn up on the bank. Probably this place serves the whole Chinese Amúr fleet as a harbour and head-quarters; the fleet consists of twelve large one-masted boats, which were fit for navigation, six of which we met with on our progress down the river. Eighteen of such boats, and without masts, seventeen not being serviceable, were drawn on shore; several of these boats would carry 300 pud (4 to 5 tons). The members of the expedition were refused permission to see the town; but at the landing place they were received by the Amban and three officers, who invited them to a tent. Near one bank all the soldiers of the place were assembled, numbering about 1000; they carried long poles with sharpened and often blackened points, which were meant to give them the appearance of pikes. A few had clumsy, heavy swords, a very few were armed with small carbines, and many had in their hands small bows, with quiver and arrows at their back. At a little distance stood ten guns and carriages, with large wheels, and of a clumsy make; each was covered with a pointed roof of

birch bark, carriages and roof being painted red; beside each gun stood a man with a stick in his hand, but it was not possible to see whether it was a match or not. During the conversation the soldiers thronged in such numbers into the tent that they required to be driven out thrice by the use of sticks. Opposite the lower town is an island on which one may see traces of an earthen wall; here the Manchurs had built a fortress in the seventeenth century to hinder the excursions of the Cossacks on the river. From the mouth of the Zeya the valley on both sides expands; the banks are perfectly low; here and there occur hills, but the Blue Mountains vanish in the horizon, the low places are covered with marsh, between which occur small lakes, bordered with bulrushes. Mr. Hertzfeldt, botanist to the expedition, is of opinion that the Dáurian flora, predominating to the mouth of the Zeya, changes now decidedly for the type of European vegetation, which lasts to the mouth of the Sungari; here grow lime, poplar, cornus mascula, bryonia alba, and several other species; hazel, oak, and black birch still occur. It is to be noticed that on the banks only low trees and shrubs grow, but in the villages and gardens of the Manchurs tall poplars and elms are planted.

Twenty-five miles below the island the Amúr turns to the east, and a little later to the north-east; the upmost layer of the soil consists of a rich black soil; in some places the thickness of half an arshin.\* On the right bank, beyond the open country, the range of the lesser Hin-Gan is seen, a branch of which, Ilhuri Alin, rising in the district of the Dáurs, approaches near Sahalian-Ula-Hoton, and continues in an uninterrupted chain eastward by retiring from the banks of the river.

At its turn to the north-east the river flows in several branches; here and there appear small villages, consisting of two or three mud hovels; the population is probably formed by exiles; a Manchur at least, who was visited by M. Permikin, appeared to him to be such a one: his dwelling, the numerous nets, and the garden, witnessed his being well off.

The country between the mouth of the Zeya and the Nioman-bira reminds one of the middle zone of European Russia; the immense space which we had seen in the last four days is able to hold a large population, and all the exigencies for breeding cattle and agriculture are at hand; beside, the Amúr has an inexhaustible abundance of fish.

*The Buriya, or Nioman-bira, 709 miles.*—Approaching the river Buriya the elevations become more frequent; it enters the river from the left side in two mouths. It seems but little frequented by the population of the Amúr; at least we were not able

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\* Arshin = 0·778 yard, or 2·333 feet.



to collect any information about it from the Dáurs and Manchurs, but one of the first Amúr towns will probably rise near the top of its principal mouth.

From the river Buriya to the Cape Sverbéef, the hills approach the river more closely, and form sandy slopes: the higher, being densely covered with vegetation, offer so many agricultural advantages, that even the Dáurs, whose chief occupation is the chase, have established little farms on them. This country offered nothing but a coarse textured granite. Here a large species of bee occurred for the first time, from the bite of which the blood directly springs forth and the body swells.

*Cape Sverbéef.*—At Cape Sverbéef (a high and gloomy mountain, which projects far into the river) the Amúr turns suddenly to the south and runs on its way 130 miles, through a ridge of high and densely grouped hills.

*River Oou.*—Above the river Oou, which enters on the right side, its banks form here and there small plains, but from the Manchur watchpost near it the river is literally pent up in stone walls. The breadth of the river, which had hitherto been one to two miles, now contracts to about half a mile, with a depth of 70 feet. The current, which sometimes reaches 5 knots, and the steepness of the mountains, are the reasons why this tract is uninhabited. The soil bears clear tokens of good condition, and fine woods of white and black birch, oak and elm, cover the slopes in any degree accessible; there is no want of firs, larches, and pines. Notwithstanding the rapid current of the Amúr on the track described, and its pertinacious struggle against the rocks which surround it, it has not been able to sweep away a single clod of earth except to form two small islands at the end of the rapid. The one on the right bank is two-thirds of a mile long, narrow, and but a few fathoms high, covered with birches, oaks, and elms. Grapes, which were already in clusters, fixed the attention of the travellers, and raised in their minds anticipatory pictures of luxuriant plains.

The second island is a high steep rock; the reddish walls pain the eye by their uncertain colouring, and even the shrubs and trees which are grouped picturesquely at the edges of the slopes seemed misplaced from the wildness of the whole picture: the depth in the middle of the river is 10 fathoms. The formation of the mountains consists chiefly of glimmer slate, and by many tokens one may conclude that precious metals will be found. A few miles farther to the southward the hills again disappear, and then the river turning suddenly to the east an endless archipelago begins, which stretches to the river Sungari, and reaches to within a short distance of the island St. Cyril. These islands do not much impede the navigation, for they crowd now on one side,

now on the other side of the river, without any natural connection between the clusters, and leaving always space enough between them and the opposite side of the river.

This country is quite uninhabited, and the succulent grasses wither unprofitably. It is only at the mouth of the Sungari that one sees three or four small dwellings surrounded by a circumvallation of hurdles which serve as an abode to the chief Manchur watchposts at the Lower Amúr, known to the timid and weak inhabitants of the lower countries under the name of Djang-Dju.

*Hin-Gan, or Kinghan Mountains.*—On the left bank of the Amúr, about 22 miles above the junction of the Sungari, the Russians have established a post, and here, September, 1857, Mr. Radde, naturalist to the Siberian expedition, dates his communication, an abstract of which will appear at the end of this paper.

*Sungari, 950 miles.*—Mr. Permikin reached the mouth of the Sungari on June 15th. He is unable to decide the question which of the two rivers is the main arm, for the mouth of the Sungari is a delta, and from the rapidity of the journey they scarcely noticed the giant river which brings with it the waters of Manchuria, but he inclines to the opinion that the Amúr enters the Sungari, because the latter keeps its direction, whilst the Amúr makes here a short turn.

The Sungari is formed by the two rivers, Giren and Naun, which unite in the neighbourhood of the town Giren Hotun, a naval station.

The sources of the first are to be found, as stated before, on the same mountain ridge in which are the sources of the Kamara and Gan; the latter comes from the interior of Manchuria.

As the Managers we met told us, the valley of the Sungari is the most populous of the whole Amúr country, in consequence of the fertility of its low banks, the convenience for the communication yielded by its low steady current on a loose sandy ground, and from the absence of rocks and shoals. Besides many insignificant places nestled on the banks of the Sungari, several towns are situated near the river and the Naun, in the following order, from its mouth upwards:—Ichai, Alchuka, Kolon, Chichigar,\* and Mangar. At the union of the Giren and Naun we find Giren Hotun, where almost all the vessels for the trade of the Amúr are built, and which, like Chichigar and Mangar, is three times as large as Aigunt. Ichai is reached by poling and tracking in eight days. The voyage to Chichigar occupies no less than a

\* At Chichigar, or Tsitsigar, 10 large vessels, 1 second class, 15 river and transport vessels, and 10 boats, are stationed, manned by 260 seamen. At Mergen, or Mangar, 6 second class and 4 river vessels are stationed, manned by 43 sailors.

month: thus the length of the Sungari to the mouth of the Giren would be 670 miles. It takes three or four days to go direct from Aigunt to Chichigar.

The low banks and numerous islands above the mouth of the Sungari extend lower down, but with this difference, that they are gradually being washed away by the Amúr, the water of which by it becomes more muddy.

At the Cape Gaidin a branch of the mountain range visible southward approaches the river, but soon retires again, leaving behind a large plain meandered by many brooks.

*River Horolog.*—The absence of hills and the intricacy of islands are particularly observable two days' journey above and below the river Horolog, which enters the river on the right hand side, and in the summer time allures a great many Manchurs to its banks for fishing; the buoys of the nets sometimes retard the progress of the ships, and the conical birch-bark huts and the variously-shaped boats of the fishers were to be seen in great numbers at every island; these, however, are only temporary residences.

*Usuri, 1062 miles.*—The country where the Usuri enters the Amúr is almost wholly uninhabited, but offers on both sides wide tracts for colonisation. The mountains forming the right bank of the Usuri are a branch of the Sihota Alin, and are to be seen at a considerable distance. The bare rocks on the right side consist of layers of glandy cinnamon-coloured jasper, talc, slate, and undulating tubular flint-stone mass, of one inch thickness, which alternates with the talc-slate. Clayey sandstone projects in large pieces from the rock; single stones of this kind are lying about at its foot, and they have even, as it were, ground off sides; looking at these torn off masses of sandstone, one could believe them to be fragments of a huge building, and not a wondrous work of nature.

Below the Usuri, settlements of Golds are frequently met with; at first only two or three houses together, then crowded in dozens. The gentle inhabitants proved very useful to the travellers from their knowledge of all the turns of the river and its branches; by help of their pilots the *Nadejda* continued her journey for twice 24 hours, night and day, in these intricate branches, which were not wider than from 58 to 116 fathoms. The villagers also provided the steamer with wood, which was very difficult to be had, the banks growing principally sand-willows, which are not suitable for steam fuel.

*Cape St. Cyril, 1272 miles.*—Three miles northward of the village of Savagga the Amúr divides into two wide branches, the right one turning E.N.E., then running along a steep bank and uniting with the left branch at Cape St. Cyril. Here Mr.

Permikin was separated from the expedition by a current, when he endured a very violent storm, but was received in a friendly manner at a village of the Golds, with whom an animated trade sprung up, exchanging sable and bear skins for the goods of the Russian vessel. He also confirms the account of M. Peschurof respecting the keeping of bears in cages.

The Golds are called by the Chinese Yui-pi-da-tzy (fish-skinned), their clothes being made partly from fish skins.

Ten miles beyond Cape Cyril the character of the country changes; the hills grow suddenly higher, dense woods occur, the shore valleys become narrower, the mountains stretch along both sides of the river in four parallel ranges, the last being almost woodless. The country on both sides is populated by the Tungus tribe of the Mangunes, whose small villages are numerous. The banks—1421 miles—were grey sandstone with indistinct prints of plants and conglomerate consisting of sandy clay, fragments of quartz and hornblende. On the mountain ridges towards the north was snow. The Amúr here becomes richer and richer in different varieties of sea and river fish.

Forty miles lower down the hills on both sides approach the river, and it flows in one arm 0·7 of a mile wide; the islands disappear; the high banks also and the cliffs are no more seen. The mountains are covered with an impenetrable wood of fir; the dark green belt of the pines contrasts strikingly with the poplar, ash, and birch covering the lower valleys; oak occurs seldom.

On examining the bank at the evening halt, porphyry was found to be predominant. This mass consisted of unequal grains of felspar and hornblende; the colour of the porphyry was mostly greenish: there occurred also in abundance chlorite slate of a dense formation, and a mixture of this species of slate with quartz likewise coloured by chlorite. Twenty miles farther Mr. Permikin encountered such an abundance of fish as he had never before seen in his life. Salmon, trout, carp, sturgeon, husos, shad, sprang out of the water and made a deafening noise; the river was like an artificial fish-pond.

Farther on they came to a place called Fats-tse by the Mangunes; here the islands began to appear again on the river. On both sides stretch mountain ranges, the summits of which are bare, but the slopes and feet covered with old pine-trees.

The river widened again—1568 miles—and the islands continued. At the bare places of the hills fine-grained slate of a dense texture, with crystals of pyrites and hornblende, were chiefly seen. The Mangunes living on these banks are, like the Golds, of Tungusian descent. They do not shave their heads like these, but wear their hair plaited in tails. In their dress and dwelling-houses they have evidently accepted a great deal from the Manchurs.

The dress of the affluent consists of Chinese stuffs and of fish-skin, which they get from two species of salmon, and which are strong and durable. The Amúr is called by them Mambu.

June 27th, Mariinsk, 1599 miles, was reached: all the ships with the exception of the steamer entered the creek, which is 150 Russian fathoms long and 10 broad.\*

The Kisi lake, on which this post is situated, is about 27 miles long, and 200 Russian fathoms wide, and naturally forms a good harbour; it is connected with the Amúr by two large arms. It is evident that this low basin, lying between the mountains, is filled gradually with water during the inundations of the Amúr, and afterwards the pressure of the water forces a passage by these two outlets, by which the lake is now connected with the Amúr.

The distance from Mariinsk to De Castries Bay is not more than 10 miles, and a railway is about to connect them.

From Mariinsk the left bank of the Amúr is low; the soil consists chiefly of clay, which is penetrated by iron oxide, in which occur in nests kidney-shaped iron ores.

Behind the Mangune village Kisi, the land is high and formed by slate, with unequal layers, and metallic glimmering; here also are found traces of iron ores. The Mangunes here are also occupied in the capture of game and sables; but the latter are of an inferior quality. The farther one ascends the tributary rivers of the Amúr, such as the Zeya, the Buriya, the Aemgun, the better becomes the sable; and beyond the Hin-gan, in the valleys of the Uchur, the Olekma, the Adan and Ud, it attains its finest quality.

About 7 miles from Mariinsk is the Mangune village of Pul; this is the place where the traders resort from the up-country. Farther down the Amúr Mr. Permikin found several varieties of iron ores, with alternating layers of slate and quartz in it. The slate here had been obviously under the influence of fire. Very high hills stretch along both banks, which are densely covered with an impenetrable virgin wood. This is the realm of the larch and Siberian stone-pine. On the slopes of the hills and valleys poplars, birch, and oak are found; rhododendrons in bloom, May 13th. The clearing of the woods for agriculture would occupy 10 years. The banks are not fit for cattle-breeding, except a few low islands which are, however, submerged during inundations.

In the first village below Pul the travellers met a new Tungus tribe, the Samagir, which together with the Nagidal or Nishdal, and four other tribes, live near the banks of Amgun.

One hundred and seventy miles below Pul, one finds the dwell-

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\* Russian fathom = 7 feet English.

ing places of the Gilyaks. These people have experienced the influence of the Manchurs less than the tribes living farther up; they are addicted to the grossest Shamanism. Revenge for bloodshed is custom, and infidelity of wives is punished by death.

The geological features of the country remain the same; only a fine-grained chalkstone of a dense texture and ash-grey colour, with quartz in it, was added to them. The Gilyak villages passed were Mangal, Dengdala, Akhta, Dyrmí, Aur, Chilvi, and Tyr; near the latter place are found some curious monuments. The first is two yards high: the undermost stone is granite; the uppermost, an irregular cube a little rounded off at the top, is grey fine-grained marble. There are inscriptions on it which were thus deciphered:—"Cloister of the Eternal peace," and "The great Tuan spread the hands of strength everywhere."

The second monument is four paces from the former: it consists of an octagonal basis, on which is standing a column. Five paces farther is another similar to the first; and 150 fathoms farther, on a cape projecting into the river, a tall octagonal column.

The traveller passed farther the villages of Hoé, Harmé, Ao, Hadin-Harmé, Kugu, Takté, Talvé. The Samagirs call the Amgun 'Hangu.' On a Chinese map in the archive of the Russian Geographical Society its name is Hinkon.

On the left bank, at Tilva, was slate and a fine-grained dense amphibolite of dark-green colours. Farther on porphyry predominated, in the mass of which were small pieces of felspar and hornblende, with a mixture of small leaves of mica. The expedition passed the villages Daigas, Deaba, Hailga (Kalgo), Mago, Anadiva, Vait; the last, with thirty houses, is the most populated on the whole tract.

The weather here was very unfavourable, and the current of the river so rapid that it drove back the boat in spite of the rowers. On the last day to Nikolaefsk the bank consisted of large layers of porphyry, opposite which followed slate of a reddish colour.

In Nikolaefsk Mr. Permikin stayed for three days during an incessant rain (10th, 11th, 12th of July), which reminded him of the periodical rains of Irkutsk. The post is very highly situated: the banks of the creek were formed by alluvial soil. Thirteen miles above Nikolaefsk all the branches of the Amúr unite in a channel which is from  $1\frac{1}{2}$  to 2 miles wide and 20 to 30 sajens (140 to 210 ft.) deep. Notwithstanding so considerable a mass of water which, in this manner, enters the Gulf of Tartary with a velocity of 3 knots, the flood-tide does not suffer it to remain of a depth worthy of the Amúr till it reaches the ocean. H.M.S. *Amphitrite*, at anchor off the bar in July, 1855, found the greatest rise and fall to be 10 feet. Directly below Pronge and Tebak, the capes at its

mouth, the water becomes shallower, and falls in the south to 13, and in the north channel to 10 feet at low water. From Nikolaefsk to Petrovsk is 80 miles: the bare rocks consist, for the most part, of dark-coloured lava, which encloses empty cells of a white colour. Sometimes occurred layers of sandstone in which was seen an admixture of amphibolite, and frequently very fine-grained slate of ash-grey colour. On Cape Pausa, which the Russians have named Polosatik, there was found limestone of a red colour, in which were enclosed petrified craw-fish. This is a very superior material for lime. The bare rock enters 1 mile into the estuary. On the shores of the estuary everywhere porphyry and lava were to be seen. The rock island, Hanjigir, where the voyage ended, consisted thoroughly of slate enclosing sulphuric pyrites. In the alluvium of the bank occur several varieties of agate.

After a sojourn of only a day in Petrovsk the travellers went on board the steamer *Vostok* to Ayan.

Mr. Shenurin, in a memoir on the Amúr mouth, states that the winter station of the Amúr fleet is at the island Vait, in the Magovski arm, which lies w.s.w. and e.n.e. The ships are in one line in a depth of 4 fathoms, and to protect them against the current of ice, piles are rammed in. On the bank are built the house of the overseer of the ships, a barrack for a hundred men, and a bath. The Amúr clears itself of ice at Nikolaefsk about the 21st of May.

Mr. Schrenk passed the winter of 1855 at the mouth of the Amúr, during which period he visited the island of Sahalin, and the following is an abstract of his proceedings:—

“Rainy weather in September. Snow in October. Amúr frozen November 3rd at Nikolaefsk. Fine weather in November and first half of September. Minimum temperature 31·6 Réaumur. Violent winds, mostly westerly, in the latter part of December and January, with snow-storms. Communication between the houses difficult.

“Left Nikolaefsk January 27th with three sledges, each drawn by twelve dogs. Crossed over from Cape Lazaref to the Island of Sahalin. On the ice, February 1st, was received in an unfriendly manner by the natives. The island is inhabited by three different tribes—the Gilyaks, the Orongs, and the Aino; the latter are located at the southern end of the island, the sovereignty of which is claimed by the Japanese.

“He returned to Cape Lazaref February 9th, and crossed over the Adara Hills to the Amúr, which is the sledge route pursued by the Manchurs and Japanese to the village of Pul, which appears to be the great entrepôt for the exchange of goods.

“In the middle of March the thaw sets in, rendering travelling by sledges difficult except at night. Swans and geese arrive at Kisi about the middle of March, but the advance of spring is later at Nikolaefsk, where the ice broke up May 2nd, but remained floating in the estuary until June. Easterly winds are prevalent in the spring.

“The Russian fleet, on retiring from De Castries Bay, first took up a position opposite Cape Lazaref, and then they found a passage into the river without lightening their vessels, and went to Nikolaefsk, which is the most important

post on the river, and is strongly fortified, and there are towers along the coast between it and De Castries Bay at intervals of 20 to 25 miles. The whole of the district is becoming settled by emigrants.

"The Imperial ukase, appointing a governor to Nikolaefsk and assuming possession of the territory, was issued December 9th, 1856.

"Chinese ambassadors appeared at Nikolaefsk about the close of the year 1855, and insisted upon the evacuation of the Amúr by the Russians."

A regular postal communication throughout the winter months is now maintained between Nikolaefsk and Mariinsk, a distance of 213 miles, and by means of relays of horses it is accomplished in little more than a day.

The opening of a regular communication along the Amúr, and a more minute acquaintance with its estuary, by which vessels enter the river from the Pacific Ocean and the Sea of Okhotsk, have rapidly and totally changed the condition of those doing duty in that region. All necessities are now brought from the Trans-Baikal provinces and from America, at prices sufficiently moderate: grain, tea, horned cattle, domestic fowls, horses, leather, Circassian tobacco, sheep skins, cloth, articles of officers' dress, and other merchandise, are brought down the river from Siberia; cotton, woollen, and silk stuffs, ready-made clothes, boots, linen, iron, and copper-ware kitchen utensils, glass, furniture, spices, sugar, treacle, wines, preserved fruits, cigars, &c., being obtained from America, and in such quantities that a superfluity of wares imported this year into Nikolaefsk led to the first exchange of merchandize between Russian and American merchants. Thus the Trans-Baikal salt meat was exported by the Americans for sale in the ports of the Pacific, whilst American sugar and cigars found their way to Irkutsk.

The natives, on their part, furnish the Russians with fresh fish, wild ducks and geese, partridges, grouse, and various fruits of the forest, such as the Chamæmorus berry, red bilberry, cranberry, great bilberry, raspberry, and strawberry.

Vegetables are grown on the spot, as well by the Russian emigrants as by those serving in that region, and, at the present time, many are able to lay in a stock sufficient for the winter.

For the replenishment of the stock of provisions, for the hire of pilots at the lower course of the river, and for any other purposes, it is indispensable to be provided not only with specie, and small silver coins especially, but also with cloth, calico of the lowest sort, common Siberian tobacco, which the natives prefer to the Chinese and American, on account of its strength and narcotic property; powder, lead, fancy articles of gilt or plated copper, such as earrings, rings, &c.; also with common and amber beads and small quantities of black and blue plush. On making use of these articles it should be borne in mind, that the tribes indigenous to the middle course of the Amúr are acquainted with the



value of silver and cloth, although with reference to the former they are often to be deluded by new silver coins; and it is therefore better to reserve the money, cloth, and plush for that part of the voyage. At the upper and lower courses, on the other hand, earrings, beads, tobacco, and calico command the most efficient services.

*Ethnology.*—The population of the Amúr, distributed irregularly over its immense extent, consists of as many as ten settled, semi-settled, and nomadic tribes.

The Manchurs, Nekans, and Dáurs may be placed in the first category, although the latter appear on the Amúr only in isolated habitations, surrounded by vegetable gardens, serving them as it were as places of repose after the fatigues of their protracted chase in the mountains, situated at some distance from the banks of the river, and to which they repair with considerable studs of horses. In the villages and towns on the Sungari the number of Dáurs and Nekans, severally, equals that of the Manchurs, who constitute, so to say, the military power of the district, and are all in the receipt of pay, defrayed probably by the tribute levied from the remaining two-thirds of the population, *i.e.* from the Dáurs and Nekans. Externally, these three tribes differ in no wise from each other; with the sole exception, perhaps, that the dress of the Manchurs in the service in some measure ennobles their coarse features. In all the representatives of these three tribes, we found the same round faces with flat eyebrows, the same dark bronze coloured skin, a middle stature, and dark flaxen hair braided into tails. The common people do not shave their heads, and their dishevelled hair has consequently the appearance of a carelessly stacked hayrick, around which is wound the tail in its vain endeavours to keep the hair in order.

The dress of these tribes consists of a loose shirt of Chinese shape, trousers of some width retained in stockings or wrappers as far as the knees, and bound round with cord, and Chinese shoes with turned-up points, or fashioned out of leather without any shape at all. Above the shirt they wear a short coat made of the skins of animals, or even of fish, girded round by a leathern belt, to which are attached a small knife, a copper pipe, a steel, and a tobacco-pouch—the inseparable companions of an Asiatic.

We seldom encountered the Nekans, and could observe nothing in any way remarkable in their character; the Dáurs received us with kindness at their dwellings, and never refused us vegetables or millet, which for several weeks was the sole food of the whole crew of the *Nadejda*. Selgeni, an acute Maneger, who had seen a good deal of that part of the world, and whom we subsequently met, did not speak in very high terms of the Dáurs. It is possible that this tribe keeps itself distinct from the other nomadic

rares subjected to China ; and Selgeni, who had had some transactions on the Sungari of a nature somewhat unpleasant to himself, spoke thus of the Dáurs out of ill-feeling ; at all events this is his opinion on the subject :—"The Dáur is quarrelsome and aggressive ; is fond of running away with anything that is not well secured, and is in general not a good boor."

Selgeni also told us that the greatest part of those who can read and write in the towns are Dáurs, which promotes their taking bribes ; so that he himself was obliged, when wishing to be freed from military service, to present one Dáur with five rubles, another with three, and to treat the third.

However, notwithstanding this unfavourable description, my personal conviction remains in favour of the Dáurs ; at any rate in comparison with the Manchurs, who certainly must exceed the former in cupidity, audacity, cunning, and passion for roguery.

The isolated dwellings of the Dáurs are scattered between the rapid portion of the course of the Amúr above the Sungari and Aigunt ; they are seen neither above nor below these limits—certainly not along the banks of the river. The Manchurs, owners of the rich plains of the middle course of the Amúr, occupy a district extending 150 versts below the Zeya. Houses, concealed behind hillocks formed of sand deposited on the banks, and by a few trees which are seen only in the vicinity of these dwellings, extend at rare intervals in a line along this fertile region. Numerous fields, tilled with a care which, to judge by the plenty displayed in every dwelling, is repaid a hundred fold to the cultivator, spread out beyond the villages, and particularly over the gentle slopes of a table-land occurring on the right bank of the Amúr.

The scarcity of every kind of wood to a considerable distance from the habitations of the Manchurs compels them to detach small parties to the dense forests of coniferous trees found at the upper course of the Amúr, beyond the Zeya, and in the neighbourhood of the Kamara, where rafts are prepared by these expeditions and floated down to the villages and to Aigunt. The improvidence of the inhabitants of the 'Shilkinsk factory,' of Ust-Strelotchni Karaul, and other stations on the Shilka, who, being surrounded by rich woodland, are careless of its preservation and permit the rafts of wood cut down by the Manchurs to pass freely down the river, greatly assists the latter in the pursuit of their vocation. Dozens and perhaps hundreds of these rafts, each consisting of about 20 choicest trees, are yearly floated past the Russian stations, whilst not a single tree will ever pass the Manchur towns ; nor is this all : the Manchurs, in parties of twos and threes, ascend the river in canoes for the purpose of seizing rafts which are on their way down, and after collecting them at one spot, will float 5 or 6

at a time down to their homes. The Manchur character must partake of the shortsightedness of the Siberian Cossack, for otherwise they would have no raft hunting.

It seems that after agriculture, the catching of rafts forms one of the principal occupations of the Manchurs, if we except the fishing pursuits amidst the clusters of islands at the river Horolog. In this, however, the inhabitants of Aigunt and the neighbouring villages do not participate, as it would necessitate their passing the rapid portion of the Amúr—the stumbling block to rapidity of communication at that part of the river.

The Manchurs and Nekans from the Sungari assemble at the embouchure of the Horolog for the purpose of fishing. The Dáurs do not, in all probability, take part in this innocent occupation; hunting the elk, roebuck, and other animals being a pursuit to which they devote themselves at every suitable season of the year. The sable, also, being an animal of the greatest value, and one in which their tribute is exacted, attracts their particular attention. Notwithstanding the inconsiderable extent of surface occupied by the villages of the Manchurs, we find this tribe along the entire district situated between the rivers Kamara and Horolog, and even lower, almost at the very mouth of the Amúr. The cause of such a diffusion of these crafty traders is attributable, firstly, to their vocation of fishing, and secondly and principally, to their strenuous exertions to derive, by any means soever, every possible advantage from their neighbours, and the establishment of military stations for watching the tribes subjected to them. The chief stations are situated at the embouchures of the rivers Kamara, Sungari, and Usuri; and those of a secondary importance—constructed more for facilitating communication—are found half-way between the former. Each of these stations is composed of 20 to 25 Manchur soldiers, under the command of one or two Boshko;\* a set of jobbers who mercilessly fleece the poor weak roving population.

The duty of the stations consists, principally, in collecting the tribute, and in preventing some of the nomadic tribes from stepping over the boundaries assigned to them.

All the tribes subjected to China have a uniform amount of tribute imposed upon them, namely, a sable for every male from 15 to 60 years old, inclusively. The tribute is collected at two periods of the year, in March and October, when the tribes either collect together or break up their encampments. He who cannot pay his tribute is taken to Aigunt, or to the Sungari, according to whether he belongs to the Manegers, Kapliars, Beliars, Golds, or other races indigenous to the lower course of the Amúr; the

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\* A kind of sergeant.

insolvent thus transported is then allowed to obtain the fur by purchase, and he finds no lack of charitable traders who vie with each other in hastening to offer him their services with the object of getting the poor fellow into their hands, from which he will find it a matter of no small difficulty to extricate himself, and if ever to be accomplished, it will only be in a state of perfect nudity.

The rule of the Manchurs appears to weigh most heavily on the tribes along the banks of the lower course of the Amúr. These poor creatures are forbidden, under penalty of death, to ascend the river higher than the Sungari. It is difficult to explain satisfactorily the cause of the severity exercised towards these meek tribes; but it would seem that the petty Manchur traders were the principal instigators of it. These Manchurs, descending from the towns on the Sungari, to the scattered villages of the Golds, Mangunes, Samagirs and Gilyaks, with cargoes of Chinese merchandise, furnish them with all necessities, and barter their goods for fables, foxes, and other fur-bearing animals; and also for fish-skins and glue; of course with immense profit to themselves. Were a free access to the markets of Chichigar, Mangar, and other towns on the Sungari, granted to the above tribes, it would put an end to the exorbitant gains of these merchants; and there is no doubt that all their endeavours are directed against permitting such an amelioration in the condition of the Golds and their neighbours.

The Golds, Mangunes, Samagirs, and Gilyaks just named, might have been included among the settled tribes of the Amúr territory; but as they are totally unacquainted with agriculture, and often abandon their winter-quarters, erecting temporary huts at that part of the river which most abounds in fish, they may be termed "semi-settled."

Owing to the great similarity of features which connect the tribes just mentioned, it would be necessary to enter into the minutest details of their respective idiosyncrasies, in order to draw a strict line of distinction between them; and in the absence as yet of sufficient data, we must fain content ourselves with a cursory glance at their mode of life. The settlements of these tribes occupy the entire course of the Amúr below the Usuri, and the Gilyaks have extended themselves still farther, being met with along the sea-coast to the north and south of the embouchure of the Amúr, and on the island of Sahalin. The Gilyaks keep themselves distinct from the rest, who more or less intermingle; numerically, however, the Gold tribe exceeds them all. The Samagirs are chiefly found at the Goryn, and the Mangunes between the Golds and Gilyaks. Fishing is the means of support of all the "semi-settled" tribes without exception, and their permanent or winter habitations are therefore erected along the

principal bed of the river, together with all the appurtenances of a fishery, including sheds for the preparation of "ukola," a fish dried in the sun, and constituting their food during winter, as also that of their numerous droves of half-starved dogs.\*

The winter habitations in these settlements resemble large square barns. Pallets are laid along the four walls and around the stove, which is placed in the centre of a well rolled earthen floor, the chimney being generally so constructed that the smoke, in passing through it, makes the round of all the pallets, affording warmth to those stretched upon them. In a house like this, a whole family, from grandfather to grandchild, and composed sometimes of 30 or 40 members of both sexes, is generally located. Around the houses and along the banks of the river may be seen the sheds for the preparation of fish, and for the reception of their nets; whilst cages containing bears appear in the extreme background.

Among these tribes, and among the Gilyaks especially, the bear is the object of the most refined solicitude of an entire village, and plays the chief part in their religious ceremonies. This part, however, terminates tragically for the poor bear, for he is slaughtered, roasted, and eaten up at a general feast. This ancient custom disappears with the gradual mollification in the manners of the natives, visible on leaving the embouchure of the river. For the purposes of fishing and inter-communication, every village possesses a considerable number of boats, which, although of an original appearance, are, nevertheless, well adapted to their application by their capaciousness and swiftness.

These boats are composed of three broad planks, of which the one forming the bottom being somewhat bent towards the extremities, receives the edge of the side pieces, secured to it by wooden pins. Their dimensions differ greatly; those we saw were from 2 to 16 oared. Each rower is provided with two short, broad bladed oars. For short and rapid voyages, all the tribes of the Amúr make use of a kind of canoe, made of birch bark, and to which they have given the name of "Omoroch." These sharp-pointed and shallow canoes are remarkable for their lightness and swiftness; but their use requires great habit, which is particularly called for on landing or starting, the birch bark being then most liable to damage, and the voyage consequently most subject to interruption. An omoroch carries from one to three men; they are propelled by long oars, with blades at each end, or with small paddles, a pole being used on longer voyages and in shallow places.

In winter, communication between the villages is carried on

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\* Another Russian traveller, Mr. Raevsky, says that the dogs of the wandering tribes have the greatest aversion to Russians, and that, *vice versâ*, dogs belonging to Russians dislike the nomadic races.—*Travels*.

with a velocity which is at times remarkable, by means of sledges drawn by dogs. This mode of travelling is more developed at the mouth of the river, and on the sea-coast, and renders great assistance in the exploration of that region. It is but justice to add that in general—with the exception perhaps of a little unpleasantness with the more rude Gilyaks—the inhabitants of Sahalin, the Golds, Samagirs, Mangunes, and river-Gilyaks have hitherto greatly contributed to the comfort of the first Russian settlers.

In conclusion, a few words must be said on the truly nomadic tribes of the upper course of the Amúr, such as the Orochens, Manegers, Gantsi, and Kapliars.

The Orochens—a Tungus family, under the protection of Russia—roam in the vicinity of the Russo-Chinese frontier places, and occupy themselves during the summer months with fishing at the small streams falling into the Amúr, between its head and the river Emuri, and during the winter and autumn in hunting.

The chase of the roebuck,\* elk, common roc (*Cervus capreolus*), sable, squirrel, and other animals, will sometimes allure the Orochens for several hundred versts into the interior of the forests, where they not unfrequently meet with the Cossacks of the frontier stations, and pass whole months together with them in hunting the wild and clumsy bear or the more nimble sable and squirrel.

The Manegers constitute the most numerous of the nomadic tribes subjected to China. They wander in the vicinity of the Kamára and its basin, and like all their neighbours devote all their attention to hunting and fishing. The latter vocation, however, they pursue only during spring; assembling for that purpose on the banks of the Amúr and Kamára, and then again retiring to the forests and mountains adjacent. According to Selgem, it would appear that this race is subdivided into tribes, having their own chiefs; and that, beside the tribute paid to China in sables, it furnishes a few soldiers, who after being selected are despatched to the Sungari river. When opposition to the insurgents who have lately disturbed the peace of the Celestial Empire called for a levy over the Amúr territory, the Manegers contributed a thousand men—another proof of their numerical strength and strict subordination.

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\* The roebuck is an animal resembling the elk, but has a smaller body, although its head is comparatively larger. Its flesh is savoury and nutritious; but the principal value of this animal lies in its horns, which contain at a certain period of the year—I think, in March—a marrow of peculiar medicinal properties, which is highly prized by the Chinese, who, at the best season of the year, pay as much as 60 rubles (9*l.* 10*s.*) for a pair of good horns. In catching the roebuck, the Orochens, Manegers, and other Tunguses, wandering in this district, make use of a kind of wooden horn, with which they cleverly imitate the cry of the male or female.

On visiting the Amúr in summer it is difficult to ascertain the exact number of the Maneger tribe, as even at the places where they chiefly assemble two or three huts will scarcely be met with on an extent of some dozen of versts—a desolateness caused by the removal of the entire tribe into the woods and mountains. In winter, when the Manegers leave the forests, the banks of the Amúr and Kamára, according to Selgeni—our sole authority in this case—are literally covered with huts of birch bark, and teem with life.

The rest of the nomadic tribes mentioned above, the Belians, Gantsi, and Kapliars, belong, it is to be presumed, to the Tungus race, found roaming along the left bank of the Amúr, and have probably derived their appellations from the streams in the vicinity of which they wander. All these three Tungus families, of which the Belians are found on the left, and the Kapliars and Gantsi on the right bank of the Amúr, pay their fur-tribute to China in sables like the Manegers.

Their poverty at times is so extreme, that for whole weeks they subsist on nothing but dried bird-cherry; going about almost naked, notwithstanding the rigour of the climate.

### *Journey from Nikolaefsk to Yakutsk.*

LIEUTENANT SHENURIN left Nikolaefsk on the 23rd March, 1856, in a sledge drawn by 11 dogs, and thus describes the route:—

“The road lies to the w. along the Amúr, where, on an extent of 50 versts, Gilyak settlements frequently occur. The breadth of the river at this part is from 3 to 4 versts (2 and  $2\frac{2}{3}$  miles); the principal channel lies along the right bank of the river as far as Cape Tebak, passing which it takes a direction to the s., and then ascending from the cape to the n.w., leads nearer the left coast past Vait Island to the Magovski stream—the winter quarters of the Kamchatka flotilla. The Magovski stream lies w.s.w. and e.n.e. The vessels of the flotilla are moored in a line over a channel carrying 5 fathoms, and are protected from the ice by piles.

“A house for the superintendent of the vessels, barracks for one hundred men, and a bath-house, are erected on the banks of this stream. The islands, which are all low, are covered with small copse wood, and are mostly submerged on the breaking up of the ice, whilst in winter they are almost entirely obliterated by the snow.

“The banks of the river are bordered by high mountains and cliffs, valleys with small elevations appearing between. These

elevations, which are mostly not liable to inundations, are inhabited by the Gilyaks in the seasons of winter and summer. Wood is found on the mountains in abundance, and of a considerable size, suitable also for building purposes; but the felling of the trees is attended with great difficulty on account of the steepness of the mountains.

"The only domestic animal of the Gilyaks is the dog, without which they never stir; in the summer the dogs are employed in towing boats along the cliffs, and in the winter they are harnessed into sledges. They are also very fond of cats, but cannot succeed in breeding them, in consequence of the Manchurs, who carry on a trade in that animal, bringing only gelded ones to the Gilyak villages. A Gilyak will often exchange one or two beavers for a kitten. The food of the Gilyaks consists of fresh and dried fish, which likewise constitutes the food of their dogs. A puppy is their dainty fare. They are all idolaters; the wealthiest have several wives, but the first is held in greater estimation.

"On the 24th March I reached the river Maya, and having hired two Gilyak sledges, I left on the 25th, proceeding by small streams to Lake Orel (or Urul) without meeting a single habitation during a journey of 14 hours. A severe snow storm\* from the n.w., accompanied by a frost of 16° R., compelled me to stop at the mouth of Chlia-lake.

"26th.—After midnight the storm abated, and we continued our journey to Lake Orel, the entrance to which is particularly remarkable by a somewhat high cape on the right, not covered with snow; here I found two huts belonging to the Nagidals, who have intercourse with the Tunguses. Having procured a guide we crossed the lake from s.e. by e. to n.w. by w. The eastern shore is rocky, and has many projecting headlands. The western is low and sloping, with dry sandy banks separated from the shore by 2 or 3 versts, and not covered with snow. At 11 p.m. I reached the mouth of Burbukan River, and put up for the night in a Nagidal winter-lut. The Nagidals brought my sledge into the hut, with the view of protecting my provisions from the dogs. Tired, I disposed myself to sleep, but no sooner was all quiet than the rats issued in droves and fell upon my eatables. This circumstance, combined with the insufferable odour of putrid fish, and the effluvia arising from the dogs and from the occupants of the hut, took my sleep away entirely. At daylight I left the hut and entered it no more.

"27th.—Reached the small river Burbukan, where I procured six good reindeer. I must observe that all the Tunguses who roam between the Ud region and the Amúr are very poor; they

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\* Locally called "Purga."



very seldom have more than forty reindeer each. The huts of the Tunguses are generally erected on hillocks, in the vicinity of morasses, principally where silvery moss is to be found. These huts consist of several poles united together at the top in the shape of a cone, covered with the skin of the elk. An aperture for the smoke is left at the top; branches of trees covered over with snow are laid round the bottom outside the tents to prevent the wind from blowing under. A fire is kindled on an elevation in the middle of the hut. The Tunguses never wander about in several families, and their huts are therefore situated at a distance of 10 or 20 versts ( $6\frac{2}{3}$ - $13\frac{1}{3}$  miles) from each other.

"28th.—Continued my journey up the small river Bernukof, which flows between hills covered with reindeer moss, and almost treeless. The breadth of the river is 250 fathoms, and at some places less; huts are often met here. The Tunguses, Gilyaks, and Nagidals come here in pursuit of animals. These hills are tenanted by wild reindeer, elks, beavers, and foxes.

"31st.—Continued to proceed in a westerly direction along a marshy plain which seemed to be endless. Towards evening we reached the Moachan mountain, on which there are many large larch and pine trees; small birch trees grow on less elevated places.

"April 1st.—We ascended the mountain by an old beaten path leading to an elevated plateau. The descent is sufficiently inclined, and the bottom can be easily reached on reindeer. A sandy soil prevails in some parts of the mountain, and also a great quantity of large stones; poplar trees, and many traces of wild beasts, chiefly those of reindeer, and others also appear. No birds were visible.

"2nd.—Descended the ridge and reached the small Moachan Tundra (morass) covered with bushes and snow of inconsiderable depth. Here we were fortunate enough to shoot two partridges with reddish heads, and one grouse. After midday we arrived at the river Ushalgin, which has a N.E. direction; its banks are elevated, steep, and bordered by thick woods. Its breadth is from  $\frac{3}{4}$  to 1 verst ( $\frac{2}{3}$  mile), and the ice upon it is covered with a rapid stream of water. This caused us to follow its banks in a direction of N. by E. and N.N.E., until at last we found a convenient part for crossing. On passing over to the other shore we were overtaken by a severe snow drift, and were therefore obliged to stop for the day, taking shelter from the strong N.E. wind behind a hill, and kindling a fire which refreshed and warmed us after so difficult a passage. After the genial action of the fire had resuscitated our members we whiled away the time in agreeable conversation without observing its flight, and would have sat much longer had not the reindeer, which were feeding at a short distance from us,

assembled near the fire, as if asking protection; this interrupted our conversation. We armed ourselves, and silently awaited the attack of some wild animal. Our expectations, however, were not realised, nothing appearing out of the wood. The Tunguses expected a bear, saying that they usually came out of their lairs at that time.

"3rd.—Proceeded through a valley between two hills in a w.n.w. course, and arrived at the River Ulbin; but from the water covering the ice, we were only partly able to advance along it, retiring at intervals into the woods, and making our way through defiles and ravines overgrown with bushy larch trees.

"Towards evening we gained the s.e. shore of Ulbinsk Bay, which extended farther than our sight could reach, and which was then covered with ice. Many shoals covered with snow occur at the mouth of the Ulbin, and along the shores of the bay, on which a quantity of drifted timber, partly covered with sand, is to be seen. It must be presumed that on the bay being freed from ice the waters rise high, as trees on sufficiently high elevations are to be found prostrated with their roots, which can only be caused by the pressure of ice. The shores of the bay extending to the n. are steep, with high hills. Some Nagidal and Tungus huts are scattered at the mouth of the river. According to the statement of our guides, many trading vessels touch here during the summer season, and are employed in extracting tar, and in boiling down fat in ovens constructed on the shore for that purpose; and in taking in a stock of fresh fish, which they cure here.

"5th.—Crossed the Bay of Ulbinsk. For the first time we saw to-day a flock of wild geese flying southwards. Halfway on the bay, somewhat to the northward, we observed two Tunguses with seven reindeer, who soon joined us. They were carrying the mail from Udskoi Ostrog to Nikolaevsk Post. After conversing with them and writing a letter to my friends at Nikolaevsk, we continued our journey, and before sunset arrived at the n.w. coast of the bay, at the mouth of the Syran River, where we found several scattered huts with fishing nets spread out to dry. A great assemblage of traders occurs here. The banks of the river are steep, with sandy rocks; the right is higher than the left, and is covered with cobble stones, which crumble under the feet; after crossing on foot over the ice to the left shore, and letting the reindeer loose, we prepared to pass the night in a wood of birch trees.

"6th.—A strong n.e. wind, accompanied by a snowdrift, prevented us from continuing our journey. During the course of the day we visited the river on snow shoes, and saw several wild ducks flying across, but did not succeed in shooting any. Returning to the place of our encampment we were met by a Tungus who was

with tears bewailing the prospective loss of one of his reindeer which had become lame. We gave him 10 rubles and ordered the reindeer to be killed: a circumstance which afforded us a luxurious dinner, consisting of soup made with buck wheat and reindeer flesh, and a roasted joint. We took the remaining flesh of the slaughtered reindeer with us.

"7th.—The wind abated; snow falling in thick flakes. We continue our journey to the mountains, sending a guide on before to distinguish the road. The deep snow has quite exhausted our reindeer, which begin to lie down; we have succeeded, however, in reaching an encampment just abandoned by some Tunguses, and observe a fresh reindeer track leading to the N. along the main ridge. We heard some shots here which we answered in the hope of seeing some one, but no one appeared.

"8th.—The weather has cleared up. Having ascended a ridge covered with larch and cedar trees, we got a sight of Tugur Bay. By a very steep icy slope we descended the ridge, supporting ourselves with the aid of poles, and clinging to the boughs of the cedars. The descent is so steep that one of the reindeer lost his footing. On gaining the bottom we arrived at the Kutim rivulet, and followed down its course between the bends of mountains with stony overhanging ledges covered with moss. Cedars chiefly prevail along the banks of this river, huts of Tunguses, who come here to catch fish, occurring occasionally.

"9th.—Reached Tugur Bay and walked along its shores in snow shoes. Passed the night on the shores of the bay.

"10th.—Continued our journey in the same direction and arrived at Maimaehin rivulet, which falls into the Tugur.

"11th.—Leaving the rivulet we proceeded along Tundras, slightly covered with snow, and with inconsiderable elevations overgrown with the larch and Siberian silver fir (*Pinus piehta*), and reached the River Takany.

"12th.—In consequence of the overflowing of the river and the broken ice, we journeyed through woods and morasses to the River Tarom, in the vicinity of which are large meadows and woods, which, on elevations, we chiefly found burnt. The breadth of the river is about 2 versts ( $1\frac{1}{3}$  mile); the banks are formed of cliffs and are entirely denuded of wood. Crossing the river at the Tyłsk ridge we encamped for the night. We saw four wild reindeer here. The frost visibly decreased, and during the last six days did not exceed  $6^{\circ}$  at night and  $2^{\circ}$  during the day.

"13th.—Ascended the Tyłsk ridge. The pathway leading to its summit trends along a steep slope between overhanging stones. This descent occupied five hours, including two stoppages of half an hour each. An extensive panorama of wild Siberian nature presented itself to us from the summit of the ridge; the Sea of

Okhotsk, the River Taron, flowing between terraces of high mountains and dotted with islets, and the Ud ridge with many other mountains, opened before us. The descent from this ridge is more difficult, and is steeper than its ascent; so that we were obliged to proceed in a circular course, descending gradually to the River Tyla, which rises in this ridge. There we met a Tungus family returning from the Burukan chapel, to which the Tunguses resort in order to keep the fast.\* At the Burukan chapel the Tunguses exchange their furs with the Yakuts for tea, sugar, tobacco and silk manufactures.

"14th.—Followed the course of the Tyla River, descending gradually to the base of the small Tutkanski ridge; and having crossed it, we arrived at a rivulet of the same name, along which we proceeded as far as its fall into the Ud river.

"15th, *Easter Sunday*.—Remained stationary till midday, breaking our fast during the halt with a wild duck. We then proceeded on the ice of the river Ud and encamped for the night at 40 versts from Udscoi Ostrog. On awakening it was with difficulty that we freed ourselves from the snow which had covered us during the night. Notwithstanding the snow drift we continued our journey through tundras along the left bank of the river. At 5 P.M. we reached the Udscoi Ostrog, having accomplished the most difficult portion of our journey.

"23rd.—Left the Udscoi Ostrog at midday, and with new guides proceeded in a northerly direction. Descended towards a morass covered with water, advancing along a narrow pathway, and stepping from hillock to hillock, or wading over the frozen surface of the ground. The reindeer which we now rode were fresher than the former ones, and at the same time practice had improved us in the art of riding them, which rendered our travelling easier. We then reached the Konskoi ridge ("kon," Russian for horse), so called from the horses used in transporting Government flour being occasionally depastured there. There is good grass under the snow on the ridge, but very little timber.

"24th.—Descended the Konskoi ridge towards Maya rivulet, on which many dry rocky shoals occur. We crossed over it to the northern shore and reached the Konnuna rivulet through tracts which had been subjected to the action of fire.

"25th.—Crossing the River Konnuna we arrived at a rocky treeless ridge of the same name; traversing this we came to the River Solurna. From the considerable swelling of the mountain streams and rapidity of the current, the ice was in many places in motion. We were obliged to build a raft for crossing, which caused a considerable delay. Placing our baggage on it and

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\* By "the fast" is generally understood the period of Lent.—*Tungus*.

making the reindeer swim across, we safely gained the other shore.

"26th.—Ascended the Solurna ridge, which is mostly covered with thin burnt wood, and descending the ridge we reached the Yakona rivulet.

"27th.—Proceeded along the Yakona rivulet towards the Djukjurski ridge, at the base of which we passed the night. The breadth of this rivulet is not more than 150 fathoms; it flows between the fissures of mountains covered with thick wood available for building purposes. A bridle path follows this river.

"28th.—Making haste, we ascended the Djukjurski ridge by rocks, which, although very abrupt, are convenient and safe to pedestrians, and descended the ridge by a sloping footpath leading to the head of the Uyan River.

"29th.—Continued our journey along the Uyan without penetrating into the woods, in consequence of meeting morasses filled with water. There is an abundance of wood here, but it is mostly damaged by fire.

"30th.—Emergèd on 'tundras' covered with snow, and proceeded on snow shoes along them during the course of the day, as far as the Kirgala rivulet, which falls into the Hotania River, and where the granaries belonging to Savelief, a Yakut, are situated. We rested here for the day. Merchandise is occasionally stored here. Disposed in the granaries and in the huts around us were some 50 Yakuts, who were on their way on horseback and on reindeer to the Uchursk fair, their goods having been despatched by the Hotania River in charge of other Yakuts. From here the country looked more lively, and attention was paid to the roads. The Yakuts had built bridges over the rivulets, and boats were kept in readiness where bridges did not exist.

"2nd May.—After crossing a bridge over the Kirgala rivulet, and passing some tundras, we came to the River Hotania, traversed the broken ice on it, arriving safely on the left bank, and proceeded through some low copee wood and an undulating tract of country abounding with mountain streams. We met many Yakuts and Tunguses to-day. They paid us great attention and strived to serve us, but were surprised at the familiarity of our intercourse with them, and also at our cooking our own victuals. This made them doubt whether we really were 'Tayons' (gentlemen), and one of them even asked us how we could prove that we were Government officials. The epaulettes and decorations we exhibited convinced them that we were really Chinovniks (officials), and they then vied with each other in serving us.

"3rd.—We continued our course in the same direction, crossing many small rivulets. The snow had in many places disappeared

here, the Spring was visibly commencing, and nature beginning to revive.

"4th.—At 20 versts from the junction of the Hotania with the Uchur, we crossed a stony ridge covered with thick wood, and descended towards the Uchur River. This ridge is called Uchur by some, and Hotan by others; the latter name appears to me the most correct.

"5th.—Continued our journey on foot along the left bank of the Uchur under overhanging cliffs of white slate and red schist to a small mountain slope opposite some granaries, where we were met by a Tungus elder, decorated with a hanger, presented to him during the reign of the Empress Catherine, and ornamented with her cypher. There was already no communication with the fair on the other side of the river, in consequence of the ice being detached from the banks; thanks, however, to the arrangements of Mr. Antonof, an official stationed here for gathering the Yasak or tax paid in furs, a boat was dragged across the ice by Tunguses, in which we were transported to the other side, where we comfortably took up our quarters in a barn set apart for that purpose. The right bank is flat and low; forty granaries in a row are built on it, and a church, with a cemetery attached, is erected on an elevation a little farther on. We procured fresh provisions from the Yakuts, such as beef, ducks, geese and biscuits.

"We were prevented from continuing our journey until the 11th, the ice having broken up. The Yakuts proposed to transport us to the Aldan on rafts; but by the advice of Mr. Antonof we declined to adopt this course, as rafts are often wrecked at the rapids. We hired six horses and two guides to conduct us to the Omgynsk village.

"11th.—Leaving the Uchur, we shaped our course northwards through morasses and over mountains. We regretted the loss of the reindeer during the first day of our journey on horseback. Travelling on reindeer is much safer and more convenient; the reindeer is also very obedient, is accustomed to the woods, selects the way, and runs steadily. A horse, however, becomes frightened in the woods; nor does he understand choosing the way, and either often stumbles or refuses to go on. This often compelled us to dismount and take the horses by their bridles.

"12th.—Rain and snow falling the whole day. The road continues the same. Towards evening we encamped for the night in a granary not far from the River Maloi Ain. Continued our journey the next day towards the River Maloi Ain, constantly meeting Tunguses on their way to the Uchur. Constructed a raft for crossing the Ain. Large meadows are here met with.

"14th.—Proceeded in the same direction through deep 'tundras' and mud, and reached the Bolshoy (great) Ain River, over which

we crossed in a boat, making our horses swim across. The right bank is rocky and of sandstone formation; the left is low. Here we met a priest riding towards the Uchur, and many rich Yakuts.

"15th.—The roads after the River Bolshoy Ain became very bad; every mountain stream detained us, our horses floundered in the mud, so that we scarcely made any progress. After four days' exertion we reached the Aldan River, where we rested for the day with some settled Tunguses.

"20th.—Crossed the Aldan in a boat kept for the purpose by a company of Tunguses. The breadth of the river at this place is about 4 versts ( $2\frac{2}{3}$  miles), with a rapid current along the left shore. It is bordered with high cliffs of white and red slate. Cultivated fields, sown with corn, begin to appear here. Leaving the Aldan, the nearer we approached the Omga River the more apparent became the labour of man, endeavouring to assure his existence. Herds of horned cattle, horses, sheep, kitchen gardens, fields, and in general everything necessary for men leading a settled life, are to be seen here. Little attention is as yet paid to the roads in this region, and they are consequently swampy and muddy, so that the last days of our difficult journey were more fatiguing than the first.

"24th.—Arrived at the Omga River and crossed over to Omginsk village in barges. Fifty days had now elapsed since we left the Nikolaevsk Post; the journey was laborious and fatiguing, but not destitute of interest. During this interval I had made myself acquainted with the character of the Tunguses and Yakuts, and I must gratefully confess that they have many good qualities, notwithstanding that they are wandering tribes. Our first guides to Udscoi Ostrog, who belonged to a wandering race, living mostly in the woods, and removed from civilised people, and even from other families of their countrymen, could not, it would appear, have assumed that attention and solicitude with which they constantly surrounded us. Their first care on arriving at an encampment for the night was to prepare a comfortable and sheltered spot, after which scarcely sufficient time to look around would elapse before the active Tungus would bring a kettle of hot water, affording the luxury of a cup of tea in a bed laid on snow. The traveller may compose himself to sleep, and be assured that a Tungus will not steal anything belonging to him, and that he will not go to rest himself until he sees the traveller asleep. They are very fond of praise, and the words 'thank you' are to them a great reward.

"The Yakuts like the Tunguses are honest and try to catch each glance in order to be of use; they are keener sighted and more artful than the Tunguses, but then they have a better idea of the dogmas of our church, and no Yakut will ever enter a hut without

crossing himself, nor will he commence work without invoking the aid of St. Nicholas.

"Having remained in Omginsk village until the 25th May, I proceeded to Yakutsk by post, and on the 28th arrived at the right bank of the Lena, where from the bad state of the roads I remained until the 29th."

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*The Amúr Voévodship, according to VASILIEF.*

THE Amúr Voévodship, according to Vasilief called Hei-lun-tszian in Chinese, and Sahalian-nla in Manchurian, was founded in consequence of the aggressive movement made by the Russian Cossacks in the seventeenth century. It was then that, with the view of offering them resistance, were founded the towns of Hei-lun-tszian, Mergen, and Tsitsigar, whilst a special voévod (tsian-tszium) was appointed, who, although at first stationed at Hei-lun-tszian, was subsequently removed to Mergen, and at last to Tsitsigar; so that, although the voévodship retained the former name, derived from the town of Hei-lun-tszian, yet the chief administration is now concentrated at Tsitsigar.

Chiehigar, or Tsitsigar, or even Tsielagari, was formerly nothing more than Bukei village, situated on the banks of the Nonni-tszian. It was enclosed with a wall\* only in the year 1791, although in the year 1700 it had already become the residence of a tsian-tszium. It lies 1800 li† N.E. of Mugden, and as it stands on the frontier between Manchuria and Shamo, in a region which separates the eastern part of northern Mongolia from the south-eastern, and which in ancient times was inhabited by historical races, it is not surprising that we find a great number of ancient fortresses there.

Otszidai,‡ E. from Tsitsigar, distant 300 li, circumference 1 li.

Guehen (an ancient town), 200 li E. of Tsitsigar, on the banks of the river Erbehei, and on the boundary with Ninguta, which lies E. of it.

Kiit (a monastery), 50 li W. from Tsitsigar. W. of it are the villages of Ilularehi and Van-yan.

Godo, 70 li W. of Tsitsigar. Haliatai village is situated W. of it.

Lebutur (Lebtur), 60 li S.W. of Tsitsigar; it is surrounded by lakes: S. is Chagan, and on the S.W. Ontohon.

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\* Wooden, earth being filled in between. The inner town was 1030 paces in circumference; the outer 10 li.

† A Chinese "li" is equal to about half a Russian verst, or about  $\frac{1}{3}$  of a mile English.

‡ It was taken by Taitzu in 1604, during his war with Ehé.



Olhon,\* 30 li w. of Tsitsigar, with a circumference of 2 li; the village of Ugur lies N. from here.

Cholé, s.w. from Tsitsigar, 150 li.

Gabutsilai, 300 li N.E. from Tsitsigar.

Nayan (80), 360 li N.E. from Tsitsigar, circumference 600 paces.

Achilan, 200 li E. from Tsitsigar, circumference 1 li. It is on the banks of the Tsi-tsin.

2. Mergen, situated at 435 li N. of Tsitsigar, was founded in 1687, and is surrounded by wooden walls; from 1691 to 1700 it was the residence of a tsian-tsiun, on whose removal to Chichigar a fudutun was left.

The 'Sahalian Journal' enumerates here the following villages: Unchar, on the river Nemer, inhabited by the hunting Dahurs, who pay their tribute in furs; Milteger village lies at 10 li from it; hence to Kongolchin village are 20 li, hence to Nayan village 40 li, from it to Berké village 30 li, from it to Burdé village (situated on the high road) 40 li; from Mergen to Kaiku village, inhabited by the hunting Dahurs, who rove along the banks of the Non, 30 li beyond. The following villages occur in succession:—

Kaiku, from Mergen, 30 li. Chjerdé, from the foregoing, 30 li.

Borchí, from the foregoing, 15 li. Chichiri, from the foregoing, 30 li.

Bohoto, from the foregoing, 40 li. Nirgi, from the foregoing, 30 li.

Iseri, from the foregoing, 30 li. Churhel is occupied by soldiers from Chichigar.

3. Heilun-tszian, or Sahalian-ula-hoto, is situated at 800 and odd li N.E. from Chichigar, and adjoins the Amúr on its eastern side. It was founded in 1684, when it served as the seat of a tsian-tsiun, who, in the 29th year of Kansi, was removed to Mergen, after which Heilun-tszian became the residence of a fudutun. At 12 li N. of it is the fortress of Aihun,† which is 940 paces in circumference; it was built a year earlier than Heilun-tszian, and was at first the residence of a tsian-tsiun; it has a garrison still. There are 31 government farms 40 li S.E. of Heilun-tszian.

Ancient fortresses on the Heilun-tszian territory:—

Chjagasu (fish), 50 li E. of Heilun-tszian; lakes Chjunké and Tashan are w. from here.

Chéhété, 60 li E. from Heilun-tszian.

\* It was founded by Nikan-Vailán, who fled from the pursuit of Taitzu. In the vicinity are the following villages: Meiren on the E., Bartsiga on the W.

† According to the Sahalian Journal, Aihun lies on the eastern bank of the Amúr, and is an ancient fort of unknown origin.

Deldeni, 100 li s.e. from Heilun-tszian; the Deveu Wilds (Susu) lie w.; the Fulu and Akda n.

Kitad, n.e. from Heilun-tszian, is 60 paces in circumference.

Chjun-an,\* 20 li n.e. from Heilun-tszian; rivulets Enein and Ukesari on the w.

Esuri, 80 li n.w. from Heilun-tszian; n. are the rivulets Esuri and Kulin.

Dun, 90 li n.w. from Heilun-tszian, is 2 li in circumference.

Muru-Susu is 100 li n.w. from Heilun-tszian; Guasuli village lies n.e. from here.

Gobugar is 100 li n.w. from Heilun-tszian.

Ulusu, 300 li n.w. from Heilun-tszian, is 130 paces in circumference; the Kurga (Hulha?) country lies n. from here, and the river Ulusu w.

Humara is 320 li n.w. from Heilun-tszian; the Guen river empties itself s. of the town.

Dochen is 900 li n.w. from Heilun-tszian.

Asaszin is 900 li n.w. from Heilun-tszian.

Ukulé is 1300 li n.w. from Heilun-tszian.

Dotszin is 1300 li n.w. from Heilun-tszian; the Larila country lies w. of the town.

Yaksa (Albazin) lies 1300 li n.w. of Heilun-tszian; a bend of the Tisian river approaches e. of the town.

4. Hulun-boir is 760 li n.w. from Chichigar; it is situated on the west bank of the river Ibo, in Chjâkdan locality; a commander-in-chief, with the rank of fudutun, was placed over the whole of this region in the year 1731.

5. Hulun, 817 li s.e. of Chichigar, is 3 li in circumference; a garrison was stationed here in 1733.

6. Bordo (or Burde, *see ante* Mergen) is on the Nemer river, and is situated at 270 li n.e. from Chichigar; a garrison is stationed here, although there are no walls.

7. Butkha, 160 li n. from Chichigar, in Niltzi locality, has been garrisoned since 1728.

Although the last four places are not actually towns, they are geographically classed with them, because they are garrisoned and form important posts. As regards the lands lying e. and n.e. of Ninguta, the Chinese themselves do not consider them literally belonging to the empire, but only as paying tribute; this is what we find in 'Shen-tszin-tunchji,' xxxii. page 10, with reference to the subject. The frontier Uluses (*i.e.* nomad villages of tents) paying tribute are in the following order:—Nair, Geikéré, and Hushihar races, living on the banks of the Hulha and Sungari, 400 li n.e. from Ninguta, are registered as soldiers; those living

\* E. from here is the territory of the Sahalian tribe.

farther E. from Ninguta, at a distance of above 1000 li on both banks of the Usuri, are called Mulin, and at 200 li E. from them, at the source of the Niman river, live the Tsiagara. At 1500 li N.E. of Ninguta, moreover, on both banks of the Sungari and Heilun-tszian, live the Hé-tszin-hara. Farther N.E. from here, at 400 or 500 li, at the confluence of the three rivers Sungari, Usuri, and Heilun-tszian, live the Eden-gara; still farther N.E., at 700 or 800 li, the Feiaka. The Tsiler (Giliaks) live at 3000 li N.E. from Ninguta; they approach the shores of the ocean on the E. The other tribes of the eastern frontier who pay tribute are the Kuiara. Their territory is situated on the northern bank of the river Tumin-tszian, near the Corean Tsin-yuan, at 500 li from Ninguta.

Of course, were it desirable, we might amplify this description by giving the dimensions of the walls and enumerating every Government building contained in the towns above mentioned, their height, and so forth. A traveller, on his first visit to that country, might not perhaps allow these details to escape him; but he would then be forgetting that what he finds in one town is repeated almost exactly in the others, the general regulations for towns being but seldom departed from. Every district in Manchuria and China has a "yamyn" (court of justice) of the local governor (chji-siam-gun-shu); to it are attached—a storehouse or treasury, a granary, prison, and schools: farther on is the court of inquest (dian-li); in some districts courts of examination (audit) (cha-yuan) also occur. In other towns of a higher order the names alone of the different courts of justice are altered, the officers, chjon and fu, bearing the titles of chji-chjon-gun-shu and chjifu-gun-shu. The ruler of Mugden is called fu-in, but he is at the same time a shilan. The foregoing relates to civil ranks; where garrisons are stationed, or in fortresses generally, the house of the commandant (chen-shon-gun-shu), and barracks, together with a storehouse and parade-ground, or "tsziao-chian" (riding-school), are ordinarily found.

In southern Manchuria, besides the tszian-tszun, who is at the same time the civil ruler of the people, his military assistants, the fudutuns or meiren-chjan-gins, also reside in Suin-in and Tszun-chjou-fu; in Guan-nin, moreover, live a selin (colonel) and Nin-quan-chjo; Chjun-tsin-so and Chjun-hon-so are the residences of tsolins, or commanders of battalions.

In Northern Manchuria, *i.e.* in the Giren and Amúr voévodships, the civil power is united with the military, and we there find the house of the tszian-tszun or fudutun, a storehouse, riding-school, prison, a tower with a gong (gulou), storehouses for arms, powder magazines, storehouses for the articles in which the tribute is paid (furs, fish, honey, &c.); some, moreover, have buildings

attached for the training of hawks, hawking forming a military amusement; also warehouses for the "jenshen" or "ginseng." There are artillery stores in Chichigar and Mergen.

All the towns, and those of Southern Manchuria especially, abound in temples appertaining to the three religions. We shall not attempt to enumerate them, as too much time would be needed in pausing to inquire into the various creeds, or into the origin of the name of every idol. We will only mention that almost every town has a temple dedicated to agriculture (sian-nun-tan), a temple to the dynasty (shetszi-tan), altars to the spirits of the wind, clouds, thunder, rain, mountains, rivers; an idol protector of the town walls (chen-huan-miao), and a temple to Guan-di, who is considered the defender of the present dynasty.\* Temples to Guan-in Shan-di, Lun-van (dragon), Yaovan (the god of healing), and separate temples to the spirits of fire, riches, horses, and to the goddess Niau-nian-mia, temples of Confucius, &c., are those that are most frequently met with. It is only a few towns that possess temples belonging to them in particular, deriving their foundation from local circumstances or legends. Thus, in Guan-nin-sian is the temple of the northern guard (Beichjen-miao). Tradition says that the Emperor Shun made an offering on the Iului mountain, which occurs at that town, for the defence of Yu-chjou, and since then every dynasty has sacrificed to the spirit of this mountain.

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*The Dáuro-Mongolian Frontier of the Trans-Baikal Region.*

By M. G. RADDE.

IF by the word "Steppe" be understood an extensive, treeless and arid plain, without any considerable undulations, that term cannot, in its full sense at least, be applied to the tracts now under consideration. Scientifically, and with regard to the formation of its surface, this region should be described as an elevated extent of country, intersected by many bare mountain ranges; the valleys and low plains between which are in some places strongly impregnated with salt, and exclusively produce chenopodeæ, whilst in others they receive the waters of many small springs and atmospheric moisture in the shape of snow and rain, giving rise to innumerable small, turbid, and muddy lakes, seldom containing water fit for use, but more often impregnated with saline and alkaline solutions. An ordinary observer, one who has not penetrated into the external structure of the earth's surface, nor, what

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\* It sometimes occurs that there are several temples of Guan-di in one town, thus in Pin-guan-chjou their number amounts to sixteen, according to official records.

is of greater importance, into the properties of the soil from which he derives his sustenance, would only see here a contrast of conditions, namely, the contrast of the wooded surface to the treeless and bare, inducing him to call such a country a steppe. Whether the latter surface be level, or high and undulated, it would equally by him be termed a steppe; and only perhaps in distinguishing two contiguous regions would the mountainous and desert zone be designated as the "high" steppe.

The Dáur country on the Mongolian frontier cannot, both with relation to its absolute height and its topographical features, be even approximately compared to a regular steppe; nor can any parallel be drawn between the chemical properties of their vegetable strata. Whilst in many regions, as for instance in the extensive Orenburg, Taurida, and Bessarabian steppes, the chernozem, so favourable to cultivation, penetrates the surface to 2 and 3 feet, there is a total absence of organic remains in the woodless valleys of the Dáurian frontier table-lands; and the soil of that extensive region has not undergone any considerable change for many centuries, owing to all the elevations, and frequently the valleys, abounding in siliceous ("jasper and flint") formations, which either do not admit of precipitation at all, or with great difficulty; added to which, the decomposition of hard rocky masses is materially retarded by the dryness of the atmosphere, and the want of snow and rain.

A further exposition will show that, leaving aside the peculiar stamp which characterises the organic nature of this region, the material and moral conditions of its scanty population have succumbed to the influence of the physical conditions above-mentioned. The greater part of this desert tract, perfectly unsuitable for the production of grain, is apparently, like the inhabited regions of the Gobi desert on the south, destined by nature for the nomadic life of the wild and superstitious Mongol, who, spurning the ties of a fixed abode, scours the level plain on his fleet steed.

With respect to geographical position, the Dáurian frontier-steppes occupy a narrow zone between longitude  $112^{\circ} 30'$  and  $119^{\circ}$  E.; their chief extension is from west to east, and they are only in a few places intersected by the parallel of  $50^{\circ}$  N. latitude. If the treeless elevations are alone to be denominated steppes, the boundary of the Russo-Dáurian steppes must be drawn southwards from Nijni-Ulhun frontier station, as the mountains on the banks of the Onon extending farther west are covered all over with dense forests; on the east, on the other hand, from the above station, and between Akshinsk and Mogoitu, along the right bank of the Onon, extends a forest of tall trees, the predominating family of which, the pine, suddenly disappears a few versts east of

Mogoitu, and is succeeded by a straggling wood of birch, as far as Kubuhai.

The steppe district thus only crosses the Onon at Nijni-Ulhun, occupying also a small zone, well irrigated with numerous small streams, on its left bank.

In its easterly extension, parallel to the course of the Onon, the steppe is not bounded on the north by this river, but by a very thick forest extending between the Onon and the desert, in some places 10 miles in breadth. This forest is worthy of notice for its historic associations as the sojourn of Chingis-Khan, and also in a botanico-geographical respect, forming, as it does, a natural boundary between the river and the steppe, which is remarkable for its small breadth and its clearly defined limit on the south. The forest thins gradually towards the east, down the Onon, and terminates entirely at the place where the river bends abruptly to the north on meeting the western spurs of the Adoncholon mountains; farther in that direction, with a lesser fall, and often contracted between banks of granite, the river pursues its course as far as its confluence with the Shilka, through a wooded country more frequently overgrown only with bushes.

The frontier steppe, which has already a breadth of about 53 miles between the old Chindan fortifications and the Uldza river, extends towards the south along the confines of this pine forest, acquiring a greater width farther on. The Onon-Borza\* rivulet, flowing from the north-east, and which likewise approaches the southern offshoots of the Adoncholon mountains at  $116^{\circ}$ , and after bending to the north unites after a course of 20 miles with the Onon at Ust-Borziusk, belongs at its western middle course to the steppe region. In like manner, the more sloping southern declivities of the Adoncholon mountains, of which the summits are alone overgrown with stunted birch-trees (which are often, however, found in great density along the entire northern slope of that chain), are referable to the same region.† To the eastward, however, almost on the meridian of Tsagan-olu ( $116^{\circ} 43'$ ), two rows of woody elevations extend from east to north, intersecting each

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\* This stream is called Onon-Borza in distinction to the three Borza rivulets which fall into the Argan.

† In Dauria trees and bushes are only found on the northern slopes of mountains, from two causes. The first is, that the southern slopes are much drier than the northern, which longer preserve the moisture of the soil, and so assist vegetation; whilst almost every plant withers in summer on the southern side of the mountain. The second cause is attributable to the circumstance that the fires which occur in the steppes in spring become sooner extinguished on the north side than on the opposite, where the snow leaves the ground earlier (being, in fact, perfectly dry by the end of February), which thus offers no obstacle to the spreading of the fire. The limits of wood and bush vegetation are not governed in these regions by the rigour of the winter, but solely by the dryness of the soil and sultriness of the summer months.

other at the most westerly lower range of the Buko-Hada, where the eastern branch terminates. The bare elevations running from this knot to the south expand the farther they extend, and form, near the frontier, the wooded table-land of Altangan, so called after one of its principal valleys.

The abovementioned mountains, which terminate in Buko-Hada, form first on their eastern, then on their north-eastern extension, a water-parting between the affluents of the Onon and Argun; the Gazimur river takes its rise on its northern side. The Altangan table-land lies between two systems of saline waters; the lake of Tarei-nor is the largest representative of the western basins, whilst to the eastern belong Ubuduk, Tsagan-nor, Hara-nor, and many others. The culminating points of this region occur in the Steppe district, which here increases in width, being more than 67 miles in breadth between Tsagan-olu and Abagaitu. Having by barometrical measurement taken the height of Tsagan-olu at 2711 feet English, 500 more must be added for the mountain pass of Sektui. Only one valley, the largest and broadest of those occurring in the frontier steppes, on the Russian side, intersects the Altangan plateau from east to west, continuing on the other side of the mountains from their western slopes.\* This is the valley of the Urulungui rivulet, which flows for 100-113 miles in a direction towards the Argun, and terminates there at Novo-Tsuruhaitui military station. At its lower course, the Urulungui flows gently along a winding channel, bordered at first occasionally by bushes of the willow, the precursors of a more luxuriant vegetation than that of the steppe. The region, however, between the Urulungui, Argun, and Altangan plateau loses its vegetation more and more towards the south; on the frontier at Abagaitu it is intersected by parallel  $40^{\circ} 35'$ , and is so unproductive and barren that on that account alone, and without reference to its topographical features, it may be considered the extreme north-eastern end of the Gobi desert, which extends to the lakes of Buir-nor and Dalai.

Broad, light-green, and low tracts, overgrown with reeds, and winding only along the very edge of the Argun, intersect the bare and rocky desert, the uniformity and character of whose vegetation is at last broken by the Urulungui rivulet, at Novo-Tsuruhaitui. Lower down from the mouth of that stream the valley of the Argun assumes another aspect; and the river itself, taking a bend to the north-east, visibly contracts and flows more rapidly. Here the chernozem soil of the valley with its diversified flora also makes its appearance, so that the Urulungui may not

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\* The Urulungui valley probably commences in the vicinity of the Chinese frontier, to the west of the Altangan plateau.

only be considered as the limit of the high Dáurian steppes, but also the sharply-defined natural boundary of their vegetation.

To the north of the Urulungui commences the district of the metalliferous deposits of the Nertchinsk mountain region, remarkable also for its vegetation, which lower down, in the valley of the Argun, is very rich in forms, particularly at Chalbuchi village. It is here that the Mongolian oak, the *Corylus heterophylla*, and *Betula dahurica*, seen nowhere in Siberia, first occur. Lastly, possessing a sufficiently thick population, some portions of this region are highly favourable to the production of cereals; but it is less adapted to the depasturage of cattle than the steppes, on account of the many mountains by which it is intersected.

To describe in a few words the boundaries of the high Dáurian steppes, it suffices to say that their limit on the north is formed by a pine forest extending along the right bank of the Onon, by the Onon-Borza rivulet, and the Adoncholon mountains, together with the elevations at the upper courses of the Gazimur and Urulungui rivulets; on the south-east by the Argun; and on the south by the Chinese frontier laid down in 1727; the western extremity of the steppe being bounded by the forests on the right bank of the Onon.

The whole of this country, occupying an area of 380 square miles, attains an absolute height of 2200 at its greatest depressions (namely at Kulussutaefski military station on Baryn-Tarei lake), and almost 3000 (English) at its highest elevations. Numerous mountain chains, rarely however detaching isolated spurs, intersect it in various directions, forming broad valleys with a saline soil, and which are often found to contain accumulations of precipitated Glauber salt and soda, but seldom any water-basins. Even where the latter occur, they never attain any considerable depth, and are mostly so shallow and level that after a snowless winter or hot summer they completely dry up and frequently remain in that state for many years. The most striking example of this is afforded by the great Baryn-Tarei lake, lying south of the Kulussutaefski frontier station, which was found dry by Pallas in 1772; since then it again filled with water, which entirely evaporated five years ago, so that it now only presents a dry, saliferous, and muddy bottom, cracked in numerous wide fissures by the burning rays of the sun. With the exception of a few rills, generally only filled by snow-water in spring, and remaining perfectly dry during the greater part of the year, a small number of spring morasses are alone to be found there. Not unfrequently such morasses occur in the vicinity of saline lakes; but often, having no efflux, they drain themselves, when, owing to the pressure of water beneath, the surface round their swampy edges rises several fathoms in winter with its icy covering. The ice



remains in such places until the middle of summer; and even so late as the month of June I have seen on a freshwater morass near Kulussutaefski, in the neighbourhood of Tarei lake, blocks of ice 1 inch thick, capped, as it were, with a layer of earth of the same thickness overgrown with reeds.

With such a scarcity of water and so great an elevation, it is conceivable that the atmosphere of this region must be very dry. To the south, at the same time, of this frontier zone, extends an immense desert, and on the north the rainy clouds, being attracted by a dense forest and arrested by elevated ranges, discharge their waters to superfluity over the wooded district of Nertchinsk; whilst some 7-14 miles more south not a drop of rain or dew will fall for months together. At the village of Tsagan-olu I witnessed, at the beginning and latter part of the month of June, examples of such an unequal distribution of moisture: whilst the heaviest rains and storms, continually interfering with my excursions, prevailed at midday in the forests only 5 miles to the north, buckwheat was being scorched 3 miles to the south of the village, and no rain had fallen since the middle of May at the frontier stations of Soktuisk (40 miles more to the south), and Kluichefski and Chindan (33 miles more westerly). It is to be regretted that scarcely any observations on the moisture of the atmosphere of this elevated region have hitherto been made, as, together with a better knowledge of the chemical properties of the soil, they might have led to some definite conclusion on the greater or lesser fitness of the country for agriculture. At the same time we find that almost useless experiments on the growing of corn have for many years been repeated with great perseverance at the military settlements on the frontier. In none of the extensive and remote regions of Russia, in the same latitude, are so many local unfavourable conditions to agriculture in all probability presented as in the frontier steppes of Dáuria; and it is very doubtful whether, even with increased labour, and the introduction of a better system of tillage, any regular or even middling harvests can be obtained. Not only is there on one side the want of rain and snow, and the great elevation to influence the early autumnal frosts, but on the other the very properties of the soil offer still greater opposition to cultivation, only perhaps to be surmounted by a Chinese density of population, and Chinese industry.

The very soil of these regions is of a two-fold nature: a great part of the steppes, and all the mountain-chains in particular, are as if sown with flint, jasper, and chalcedony, deeply buried in a hard clayey sand, and forming also the upper vegetable strata, which present no traces of fertility; whilst all the depressions of the surface are impregnated with salt, and therefore only produce a few saline plants. The climate is at the same time unfavourable

to the growth of any plant. Severe, snowless winters prevent the cultivation of winter corn, and the early autumnal frosts are generally prejudicial to the vegetables, and impede the fallow tillage. Spring-corn and buckwheat are consequently alone sown; and even those crops perish in great part from the droughts in May and June, no shade being afforded to their roots by their thin germination and the feeble growth of the stem, which only rises one foot from the ground. As a rare exception, a snowy winter will sometimes follow a series of dry years; but this, although acting beneficially on the fields, is of great injury, by its long continuance, to the cattle, which are not unfrequently entirely destroyed by the want of fodder. Under ordinary climatic conditions, the want of snow is the chief impediment to their safely passing the winter; so that, on the freezing of the few fresh springs, the animals suffer much more from thirst than from hunger, and from the first half to the end of December are often so reduced that, even with a sufficiency of food, they are unable to survive the second half of that month.

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Appreciating the advantages which Eastern Siberia derives from the opening the Amúr to commerce, Mr. Radde proceeds to consider the present agricultural wealth of the Dáurian Steppes, and its future influence and development. The first part of the Paper has already shown the unproductiveness of the country, and the great obstacles presented by its climate. Cattle-breeding, and sheep-farming in particular, would alone appear to admit of some development, as the lowlands and steppes afford good pasturage; and the prejudicial climatic conditions might, with perseverance, foresight, and industry, be rendered less unfavourable.

Wool is the only article which Mr. Radde adduces as an export, and he considers there will be no difficulty in finding a market for it in the United States. The frontier region of Dáuria and Mongolia is capable, the author thinks, of producing two millions of sheep; whilst cattle-rearing must for some years remain in its present state, owing to the scantiness of population, and the difficulty of making provision for the winter.

The following is an approximate calculation of the present state of cattle-rearing, comprising an area of 5,248,000 acres:—Horses, 24,000; horned cattle, 5000; sheep, 75,000.

Mr. Radde also affords the following observations, made at Bukkum frontier station, at an altitude of 3600 feet:—

July 5 (17).—The *Fragaria vesca* (wild-strawberry plant) has but little fruit.

July 10.(22).—Potatoes begin to flower.

July 18 (30).—The black currant (*Ribes nigrum*) has a few ripe berries.

July 20 (August 1).—Hay only about to be cut. The *Papaver somniferum* flowers. *Rubus arcticus* begins to ripen. First flowering of cucumber. The tobacco plant only  $1\frac{1}{4}$  feet in height—leaves size of the palm of the hand. Cabbage begins to form a head; the potato-apples are of the size of a common nut.

Harvest generally commences towards the latter part of August. Buckwheat is very little sown (at Bukukun).

[In a note, the 'Journal of the Russian Geographical Society' affords an interesting abstract from Mr. Radde's researches in the Chokondo, or Sohondo, range—the water-parting between the affluents of the Onon and Ingoda. It relates to the vegetation of that mountain, which Mr. Radde classifies in the following order :—

1. The lower region of inorganic valley-soil (Region des humuslosen Thalbodens), closely resembling the high Daurian steppes in its formation and flora, attains a height of 3500 feet English.

2. The Subalpine region reaches 4500 feet.

3. The region of mossy morasses (*R. der Moosümpfe und Vaccinien*) ceases at a height of 5217 feet.

4. Region of the arborescent Siberian cedar (*R. der baumartigen Zierbelfichte*), attaining a height of 6700 feet.

5. Region of the lushy Siberian cedar (*R. der Strauchartigen Zierbelfichte*), at the very base of the mountain. And, lastly,

6. The Alpine region, whose limit of extension is 8259 feet.]

*Extract from Mr. RADDE's Communication on the Hing-gan Range.\**

The breadth of the Amúr does not exceed 300 fathoms at this part; and the numerous islands which characterise this river above and below the Hing-gan do not prevail here. The water is clear and the current rapid. On the left bank, which is 3 fathoms in elevation, and is bordered by thick willows, woods, consisting of trees of various families, appear in many places. The ash (a distinct species), elm, oak, lime (*Tilia parvifolia et argentea*), isolated cork-trees (*Phellodendron amurense*), form the principal species, delighting the sight with the superb shades of yellow, red, and green, which they present. Steep escarpments running inland towards elevations scarcely 500' above the Amúr, occur at the extremities of this zone, which extends from 2 to 3 versts inland and about 6 versts down the river. All elevations are sufficiently covered with trees of various families; a clear space but rarely appears through the rich foliage of oak-groves, which flourish

\* Upper half of the Hing-gan ridge, in about  $47^{\circ}$  N. latitude, and  $129^{\circ}$  longitude, (6th) 18th September, 1857. Constant strong N.W. winds; nights cold, but not frosty; weather foggy.

admirably on elevated parts. The conical dark-green summits of the gigantic Siberian cedars, always occurring singly in this region, soar above the cupola-shaped mass of leafy trees, and near them the *Populus tremula* with its whitish-grey trunk and light-green leaves produces a beautiful effect. In the summer, the eye cannot penetrate the thick foliage of the surrounding forest, and the inhabitants of its boughs are then secure from the rapacious sight of the collecting ornithologist. Nature in her full virgin strength has produced such a luxuriant vegetation, that it is with the greatest trouble that the copse wood can be penetrated; and when even the barriers of living plants are surmounted, the trunks of dead trees present new difficulties to the traveller, who is thankful if he falls on the beaten track of a bear which he can follow with ease. Near my abode may be seen the commencement of that impenetrable underwood. Round the hard and dry stems of the *Rhamnus* bush species, twines closely and to a great height the *Maximoviczia amurensis*,\* whose red berries have just ripened; here also are several groups of the *Acer ginnala*, attaining 10 feet in height, and many bushes of the *Panax sessiliflorum*, spreading in breadth, and attracting attention as well by their leaves, which have the shape of five fingers, as by the black fruit growing to their stems in bunches. The large needles of this plant, turned backwards, catch the clothes, if the precaution of wrapping in chamois leather, adopted by the natives, be not taken. We have scarcely taken twenty paces in this maze in order to approach a withered tree, from the top of which is heard the chirping of a small flock of *Bombycilla*,† when we are already perfectly entangled in the wild vine; but what grandeur! this twining reddish verdure has encircled everything around it! A little farther the beautiful and likewise creeping plant, *Aconitum*, has covered the *Cacaliæ cimicifugæ* and *Adenophoræ*, entangling them into one mass. This sometimes is done by the handsome *Glassocomia* family,‡ or by the various species of the *Clematis*. This luxuriant littoral vegetation, amongst which the fern family also plays a prominent part, is a typical feature of the Hing-gan ridge; it belongs exclusively to it, for although the luxuriance of the Flora does not entirely disappear farther down the course of the river, yet the creeping plants which so obstruct the way farther up

\* The *Maximoviczia* is a plant discovered two years ago by Mr. Maximovitch, a traveller from the Imperial Botanical Garden. Its berries are acrid and acid; and the bark has a strong aromatic smell.

† A broad, red transverse stripe on the tail, and plumage of the same hue under it, with a cherry-coloured border on the longest outer feathers of the wings, distinguish this beautiful species. I can only remember one species of the "*Bombycilla*" (besides the *Garulla*) that is to be found in North America.

‡ I think I am right in the definition of this plant, although I have no books of reference except the 14th and 15th Nos. of the "Bulletin de la Classe Physico-Mathématique" of the Imperial Academy of Sciences of St. Petersburg.

become more scarce, and it is only the *Clematis* that does not forsake the natural meadows covered with the *Calamagrostis*, which abound everywhere between the extremities of the Hing-gan and the Usuri River. The *Calamagrostis* grows in many places to the height of a man; the *Arundo* genus, whose roots, divided by a great number of joints into bends of equal length, shoot out from under the sandy clay of the banks, which are sometimes 3 fathoms in height, often attaches itself to them. Of bushes, the *Spiræa salicifolia* occurs here all over in great quantities, as well among the littoral vegetation of the Hing-gan as on the meadows and islands of the Amúr. The *Spiræa crenata* avoid only the shady gloom of the high forests in the interior of the mountains.

Besides the plants already enumerated, the grasses and bushes which often render impenetrable that part of the Hing-gan which borders the river, I must mention a plant which prevails far to the westward,\* namely, the *Menispermum dahuricum*, and which is to be found all over the Hing-gan, in equal abundance on the islands, meadows, and level banks of the river. It is only on the more depressed portion of the banks formed by the Hing-gan ridge, where the locality is marshy, or where it presents lakes, that the Flora essentially changes. In these interesting places the vegetation brings the North forcibly to recollection; for here alongside the *Andromeda* may be seen the bilberry (*Vaccinium uliginosum*), and on some elevated parts even bushes of the *Alnobetula*. This vegetation creates surprise the more from the eye having become estranged from such Siberian types, and grown accustomed to nothing but vine branches and more southern forms. The Fauna participates the antithetical features of the Flora. In the same places where the elk† is found, the tiger prowls; and the latter animal may be called quite common, its constant abode being here.

I was informed by some Zolons, that there are always a great number of tigers in the mountains on the opposite or Chinese side. During winter they cross the river and seize the horses of the Zolons, who hunt there at that time.

10 o'clock, P.M.—Both my hunters have just returned bringing a bear with them. During the evening they had seen not less than fifteen bears, but were afraid to fire at them. We must wait another week, when bruin will have composed himself to sleep, rendering an intrusion on his privacy more convenient.

\* Last year the *Menispermum dahuricum* was gathered on the centre Argun river, at the Chalbuchy, near Nertchinsk Ironworks. Here, on the Chalbuchy, the *Evonymus*, *Quercus*, *Corylus*, and even some shrub species of the *Phyllanthus*, whose existence in these parts—at all events, that of the *Phyllanthus* and *Evonymus*—has not, to my knowledge, been hitherto known, are the first plants of the kind found in Eastern Siberia.

† The elk is not everywhere found on the Hing-gan. The extreme limit of the prevalence of the northern deer is the lower course of the Shilka.

September 10.—The vegetation of the interior of the high woods is quite different from that of the banks, formed by the Hing-gan. Although in the month of July I did not penetrate more than 15 versts into the forest to the north of my house, the excursion sufficed to make me understand the difference in the Flora. The very soil on the banks of the Amúr was impenetrable, but here the obstruction is encountered a fathom higher, as the thick verdure of the bushes prevents the traveller from ascertaining his position and the direction he is taking, his feet meanwhile having full liberty; for the rank grass barely covers the “chernozem,” or vegetable soil. In the fertile valleys again, the traveller does not know how to proceed, and is obliged to follow the tracks of animals. There are bushes in these valleys which I have not yet seen on the banks, viz.: the lilac and barberry; also the *Philadelphus* *Hedera* *Sentieosa* and *Trochostigma* *Kalomikta*.\* This latter distinct plant forms, according to its mode of germination, a link between creeping plants and freely-growing bushes. It will often, with its long tendril-like branches, firmly attach itself to the adjoining trees or bushes from which it becomes impossible to disengage it. The solitary oval fruit on its long stems hangs down, and innumerable traces of stigma are seen on its extremities. On ascending, in the month of August, the mountains bordering the river on the Chinese side,† 500 versts east of my dwelling, the *Kalomikta* was, in many places, the chief obstacle to my penetrating far into the thick and often marshy wood. This plant, as well as the vine, occur near the very summits of these mountains; this is the more remarkable since the *Hetsier* hills are open to the north on this side, whilst the ground at their base freezes to the depth of several fathoms as early as the middle of August; of which I was convinced on superintending the construction of some underground huts.

If the Flora of the grasses is much weaker in the interior of the Hing-gan mountains (the valleys excepted) than even on the banks of the Amúr, the trees on the other hand attain a strength never observed along the banks of the river. The difference, for instance, between the *Dáur birch* (*Betula dahurica*) and the *Mongolian oak* (*Quercus Mongolica*) is striking if compared in both localities. The species which on the banks are knotted, almost stunted, and mostly dry trunked (as the oak), are found some 6 or 7 versts inland quite straight and of a height of 60 to 70'. The black birch undergoes an entire change in its exterior: in the mountains its erect trunk, in general, divides into two; whilst, on

\* Also a species of the *Tiliacæ*, found by Mr. Maximovitch, but which we have not yet met with in the Hing-gan.

† Called *Hetsier*, or *Hekhtsier*.

the banks, it branches off into a great number of crooked and knotted boughs, assuming a shape reminding me of the old birch-tree of my native land. As remarkable in their height and circumference, are the *Fraxinus* and *Tilia argentea*; ash-trees, not to be compassed by two men, occur, though seldom, of the above-mentioned size.

The cork-tree of the Amúr (*Phellodendron*) and the aspen, on the contrary, appear to be indigenous only to the banks; both species attain but an inconsiderable height (30', but not above 40') on the Hing-gan mountains. The cork-tree, the bark of which is very hard, and never intersected by innumerable filaments like the *Quercus ruber*, would undoubtedly become a treasure at a later period were its growth more rapid and the deposition of cork thicker. The thickest tree I have seen here is 9' across at the lowest part of the trunk, whereas the bark will scarcely exceed an inch in thickness. Besides its solidity, however, the bark of this tree is incomparably superior in quality to that of the oak; it is distinguished by its unusual elasticity and softness. It blooms apparently but seldom; as yet, I have only seen one specimen with fruit, and there is consequently much left for me to do next spring. In many respects I look forward to next year; besides the trouble and loss of time entailed by my excursion to the Usuri, I have this year been too busy in making preparations for the winter. The leisure at my disposal I was obliged to devote to the study of the neighbouring localities rather than to making collections.

My insects are in ten boxes; they consist principally of lepidoptera, of which I have 900 specimens. Amongst them are some beautiful specimens of *Limenites* (about 13). On account of the prevalence of the oak, with which their development would appear to be connected, we found many species of these insects, while they have as yet only been found in small quantities in Eastern Siberia. I must here observe, that out of the 13 specimens, two or three may possibly belong to kindred species. I have about sixty specimens of the *Carabus sinaragdinus*, and from ten to twelve of the *C. imperialis*; five of beautiful form and colour, and probably a new species. Besides those I have more than 300 specimens of *C. Burnachewii*, and from three to four specimens with which I am not acquainted. In all I have fifteen species of the *Carabus* of Eastern Siberia. The *Cicindela*, of which I found three or four species on the islands of the Amúr, are distinct from those which occur in the Selingsinsk and Kiakhtinsk region; nor am I acquainted with them. I must also mention another specimen of the *Cicindela* found above the Hing-gan on the steep clayey banks of the Amúr, and which differs from the *C. sylvatica*, although resembling it. But I am mostly pleased that my collection is

enriched by several varieties of the beautiful Apollo butterfly; so that besides the Dorites, Apollo, and Nomion, I have three more species, with one of which I am acquainted, although I have forgotten its name. I hope also that among the Hipparchia and Melitææ, many new and interesting varieties will be found. I will bring with me fifty new specimens of the *Colias aurora*.

Of fish, the Amúr furnishes us daily with one or two sturgeons, or small *Acipenser orientalis*. We have not been fortunate with the larger fish of the latter species. A sturgeon (they sometimes weigh 25 puds = 900 lbs.) lately carried away a net and anchor, and once tore off all our hooks. Fish weighing 1 and 2 puds (36 and 72 lbs.) often occur; lately we caught a sturgeon from which 4 lbs. of roe were extracted. We have caught nothing since a week, as the fish retire during winter to the deep parts of the river, where the current is feeble and where they all live together. The discovery of such a place is a task yet before us.

While in pursuit of animals, I always had in view the distribution of leafy trees in the Hing-gan. I was very glad to find again the *Aralia Manchurica* of the Ussuri and the *Iuglas Manchurica*, the limit of whose vegetation, consequently, commences at least 450 versts (300 miles) west of the Usuri. With regard to the Manchurian walnut, I think it may be safely said that it is not found above the Hing-gan, as I only met one specimen, which resembled a shrub more than a tree, although in its fruit. It must be concluded that the *Aralia Manchurica*, on the contrary, which generally grows here in small clumps (of as many as 15 trees), and often found on the summits of the mountain range even in places where the *Pinus cembra* considerably predominates, is found to the west, as well as towards the interior of the mountain.

I likewise directed the attention of my huntsmen to the cork tree, and offered a reward to whoever should bring me a very thick piece of bark, pointing out the tree from which it had been obtained. The excellent qualities of the bark of the cork tree (*Phyllodendron*) may be seen from the piece which I forward with this letter; its healthy state constitutes its advantage over the bark of the oak. The tree itself does not appear to attain any great height, for the piece of bark in question was taken off a trunk 15 inches in thickness at its base, but which was already dead. The *Phyllodendron*, however, belongs to those species which are exclusively found on the Amúr; isolated specimens occur 10 miles in the interior of the country on the left bank, even where the *Coniferæ* entirely predominate.

Our hunting expeditions enabled us to lay in a store of the flesh of the wild boar and reindeer. With regard to our success in obtaining zoological specimens, I may here especially mention a



large species of the marten (*Mustela*) shown in the accompanying sketch, but which I cannot accurately classify in the absence of works on natural history. This species is most rare in the Hing-gan. In December we found two tracks of it, but were unable to discover the animal. The Tunguses, from whom I obtained much information on the flora and fauna, pointed to the south-east when I enquired whence this pretty animal came.

The enquiries I made of those few Tunguses with reference to the three feline families, likewise confirmed the fact of the tiger being found all over the Hing-gan, especially at its central and lower parts. The population are in consequence prevented from hunting there, as the tiger destroys their horses, particularly during winter. A few months ago they returned from a hunting expedition, owing to a tiger having made a prey of one of their horses during the first night they were in the woods. The tiger always follows the fresh tracks of the wild boar, which constitutes his principal food. The lynx is also found in the Hing-gan; but, like the *Canis alpinis*, it roams in the impenetrable thickets of the mountain. At the upper part of the range, however, where the *Coniferæ* become less thick, it is almost never found. The third feline race, which the Tunguses only know by name (calling it *Mygdu*), does not occur in this mountain; but I am told it is somewhat frequently met with in the plains of Djungaria. Probably this is the panther (*Felis pardus* P., *F. irbis* Müll.) We have, moreover, obtained three specimens of the panther? (*Meles*?), which I now find does not hibernate, although the Tunguses of this region affirm that it is only the lean and famished of these animals that roam about for prey during the whole winter, whereas their sleek brethren repair to their lairs and fall into a torpid state on the first appearance of snow.

Until the 22nd October the frost never exceeded 8° Réaumur. The sky was almost constantly clear, and the prevailing winds were from the north-west, those from the west being less frequent; with an easterly wind the sky was always clouded. During the night of the 12-13th (24-25) October, about 4 inches of snow fell; but by the 15th (27) it had already thawed on the south side of the mountain, and everywhere by the 21st. On the 21st October (2 November) it was yet so warm that a slight rain fell until the moderate easterly wind went round to the north-west; a frost of 13° set in, however, towards morning. The first ice floated down the river the same day in considerable flocs. On the 31st October (12 November), at about 11 A.M., the ice on the Amúr became stationary, although the thermometer only showed latterly a frost of 10°. The severe cold only set in on the 1st (13) November, and although at 7 o'clock on the morning of the 4th (16) November the barometer stood at 19.15<sup>2</sup>, the mercury had risen to the freezing

point by 2 P.M. of the same day. There was no snow until the 10th (22) November, after which it fell to above 1' during a storm, which lasted three days, until the evening of the 13th.

I was unfortunately obliged to abandon my intention of joining a party of Tunguses and proceeding into the interior of the mountain. The Tunguses who had agreed during the summer to my proposals, and who had promised to join me as soon as the first snow had fallen, for the purpose of having a month's hunting, have not yet made their appearance. No money would induce some other Tunguses whom I met in the woods to act as my guides. They say that their government have forbidden them under pain of death to enter into any relations whatever with Russians; adding, however, that they would willingly have served me were it not for that strict prohibition. Without an experienced guide, on the other hand, it is impossible to penetrate the Hing-gan.

In some of our autumnal excursions we often came to valleys so thickly overgrown with bushes, that it was quite out of question to pass through them on foot; and in some places I was obliged to cut my way with a knife. It was particularly difficult to pass over the hillocks of the shaded and damp valleys along which the tendril-like branches of the *Trohostigma* bushes spread, twining themselves round the young trees and clinging to them by their pliant extremities.

Mr. Radde here relates the sickness of one of his best servants, whom he was obliged to send for medical treatment to the "Hing-gan Military Station," and proceeds as follows:—

"Severe and constant frost set in on the 13th (25) December, which had increased by the 13th January.

"The vine, notwithstanding, survives the severity of the winter; and the places where an arctic influence now prevails, destroying the *Garulus glandarius* and wood-pecker, and where birds indigenous only to the extreme north are found, will in summer suddenly teem with tropical insects."

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*Journey to the Source of the Gilui River, and to the Zeya, during the summer of 1856.\** By ENSIGN USOLTZOF.

I STARTED from Ust-Strelotchni Karaul on the 14th June, and proceeded 12 versts (8 miles) down the Amúr to the mouth of the Mongalei. The expedition consisted of myself, a guide, three Cossacks, and a farrier, who was at the same time to serve as in-

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\* M. Usoltzof describes where he took astronomical observations, but as he does not give the results in his Paper, such parts have been omitted in the translation.—*Trans.*

terpreter of the Tungus language, and sixteen pack and seven saddle horses.

We first took a direction towards the Oldoi, to the point where it separates into two branches, of which the left runs N.W., and the right N.E. Here I had agreed to meet Mr. Orlof, who was to have proceeded hence along the western branch of the river, whilst I was to have followed the north-eastern. According to the itinerary the distance to this point is 175 versts (116 miles): a journey which might have been accomplished in nine days, especially since the hunters had made a path to the very Oldoi. Various circumstances, however, prevented the execution of this plan. The bad weather, which set in as soon as we left Gorbitsa, rendered the crossing of rivulets and marshy grounds extremely difficult, and was the cause of our not being able to perform this journey under a month.

On this course we crossed the following large rivulets: Amazar, Urkan, Urusi, and three branches of the Omutnoi, each of which we crossed on rafts. On reaching the Oldoi I found that Mr. Orlof had already proceeded forward; after a halt, therefore, of three days we continued our journey to the source of the Oldoi. The character of the country now commenced to change visibly—the rich meadow-vegetation of the banks of the Amúr vanishing entirely, whilst short bushy larches became predominant. The birch, red fir, and bushes, and occasionally the common fir, began at the same time to prevail either in detached clusters or mixed with other trees; the soil on which they grew being generally marshy and covered with moss. In fact the whole country was merging into a wild and barren desert.

The abundance of squirrels, alone, entices the wild Orochons to these regions, enlivened only by their presence; and even they confess that they are afraid of these places, and pass them hurriedly, when not engaged in hunting squirrels. On approaching the source of the Oldoi the surface visibly rises, the mountain ridges become higher and steeper, and high bare glacier peaks appear distinctly in view in many places on both sides. Fodder for the horses was only procurable in the valleys of the lateral rivulets, and here and there in narrow patches along the banks of the Oldoi. We were therefore obliged to halt where we could find good pasturage for our horses. On the 21st July we reached the source of the Oldoi, and crossing a low ridge came to the upper course of the Tanda River. After proceeding for about 120 versts (80 miles) along the valley of the Tanda, and 10 versts ( $6\frac{2}{3}$  miles) before reaching its mouth, we emerged on the Gilui, which we then ascended for about 47 versts (31 miles). Leaving it on one side we crossed the following large rivulets falling into it: the Anamungan, Djubkokhin, and another without a

name, and then again neared the western head of the Gilui, known to the natives by the name of Olgongro. Ascending this stream, first along its right bank, and then crossing it, we halted on the 17th August at 10 versts ( $6\frac{2}{3}$  miles) from the Atychan mountain. The Olgongro disappeared to the left, where it bends round the western foreland of a mountain range. I do not consider it superfluous to say a few words on the character of the region we had traversed, as it influenced the difficulties we had to encounter before reaching the Atychan.

Immediately after crossing the mountain ridge we entered the swampy valley of the Tanda. Here the absence of all pasture-lands, and an unbroken chain of mountains, and hollows choked up by thick underwood and bushy forest plants, commenced. In some places these thickets are so impenetrable as to necessitate the use of a hatchet in forcing a way through them. Small rivulets, about 2 fathoms in breadth, occur at very short distances from each other, especially along the Gilui. Their proximity could always be ascertained a verst in advance, for a mossy and swampy surface would be sure to appear at the foot of any elevation; on nearing the rivulet, however, the moss becomes succeeded by a hillocky morass, in which water is always found, although of no great depth, giving rise to the stream, which then pursues its course between precipitous and swampy hillocks and a border of thick bushes. It is useless to seek a convenient place for crossing; the same swampy ground, followed by the same characteristic elevation, declivity, and rivulet, obtain everywhere. The monotony of the forest is never interrupted by any open spaces; it only occasionally becomes less dense, and patches of thin spare forage grass appear in places where the wood has been thinned by fire. With this exception, the slopes and even the summits of the water partings present a continuation of marsh lands and swamps overgrown with red and yellow moss. The Valley of the Gilui extends between sloping ranges, consisting entirely of moorlands, only occasionally covered with a few larch trees. Notwithstanding our great wish to ascend the Atychan ridge, in order to determine its height barometrically, we were prevented from gaining its base by the streams which were then swollen in every valley. I was therefore obliged to content myself with observing it from afar. It runs in a direction from n.w. to s.e. Two peaks sharply border the ridge at its extremities, their slopes uniting with the low hills of the Yabloñoi chain. The distance between these two peaks is 5 versts ( $3\frac{1}{3}$  miles); between them are several other peaks of various height, connected by narrow, deep hollows. Their shape is chiefly pyramidal; steep declivities commence from their very bases, interrupted in places by small terraces; they all increase in steepness towards their summits, which are craggy.

Masses of granite and deep fissures and cavities were visible. Bushes and isolated trees occur in the valleys and terraces at the base of the ridge; but its summit is perfectly bare. The distance between the Atychan and the mouth of the Mongalei is 550 versts ( $366\frac{2}{3}$  miles), according to the itinerary.

Having left the Atychan on the 18th August, we directed our course towards the eastern head of the Gilui, which we reached on the 20th; the distance between this and the western head is 40 versts ( $26\frac{2}{3}$  miles).

My guide now informed me of the plan which he had formed for the farther prosecution of our journey. He proposed reaching the upper course of the Djaltula rivulet, falling into the Gilui, and those of the Brianda and Ilikana; then by following the course of the Djaltula to reach the Gilui, and proceed, if possible, down that river to the Zeya. But as he was not personally acquainted with that locality we might possibly have issued out upon the Brianda, which falls into the Zeya, or at the Ilikan flowing into the Brianda. Abandoning, therefore, the Gilui, we proceeded up the Kuduli rivulet and reached the waterparting. I saw here that the doubts of my guide were correctly founded: the error of choosing the Djaltula might evidently have occurred, as the water-parting slopes and is covered with stunted larch and birch trees, and consists of marsh lands giving rise to innumerable small rivulets. A bare ridge was visible on the E., which subsequently proved to be situated at the upper course of the Brianda. The upper courses of the Djaltula and Ilikana rivulets ran both in a s.e. direction. We then chose the stream on the right, where we met some Orochons. We found from them that we were really at the head of the Djaltula: but they dissuaded us from following it, the lower course of the Gilui being full of rapids and its rocky banks difficult of approach for horses.

We parted with the Orochons on the 27th and proceeded across the heads of the Gaiumkona and Dulasani rivulets, and passing over the Djaltula, reached the head of the Iki River. After following the stream for 20 versts ( $13\frac{1}{3}$  miles) we crossed over the upper course of the Ilikon (or Ilikan), along which we proceeded after a halt on the 2nd (14th) September. The valley of this river extends between mountain slopes of marshy formation, covered with red moss. In some places it becomes narrowed for a short distance by the approach of the mountains towards its edges, causing it to flow between steep rocky banks. No high mountains were encountered; during the whole course we only once crossed the Dombuko range. In general the whole country seemed to form one uninterrupted summit of a high mountain chain. Only on the s.w. the bare snow clad peaks of the Gilui appeared in the distance.

After making 117 versts (78 miles) we remarked that the Ilikan visibly deflected towards the E., and knowing that it fell into the Brianda, we left its valley and took a s.w. course, keeping in view the Tukorindo glacier, situated near the mouth of the Gilui. On proceeding farther the proximity of the Zeya became more apparent; the mountain ridges disappearing entirely, and the surface increasing in declination towards the s., extensive meadow lands covered with high grass occurred, together with large lakes and bushes of willow and birch. At last on the 12th of September we unexpectedly emerged on the bank of the Zeya. We had seen it for almost a mile; but as hitherto we had crossed over many lakes, we took it for a sheet of water of the same kind. Our joy on reaching the Zeya was extreme, many of our hopes being founded on it.

The distance from the Atychan to the Zeya is 318 versts (212 miles).

Taking a general view of this journey, I cannot say that the country I crossed is altogether inaccessible to travellers. Were it not for the long continuation of bad weather, the marshy grounds would not have been so deep; nor would the rivulets have arrested our progress, with the exception perhaps of the largest, such as the Amazar, Urusi, Oldoi, and Gilui, whose upper courses are alone fordable. A journey on horseback would only have been accompanied by the difficulty of finding forage for the horses, which could not have occurred had we been supplied with reindeer. But the two Orochon tribes roaming on the Amúr and Shilka were not able to furnish us with the required number of reindeer, the richest of them not possessing more than 10 heads. The following day we commenced the construction of a raft. We had fortunately arrived at the only part of the river where, for a great distance both above and below, a patch of pine trees suitable for a raft existed. For greater safety we built two rafts, on one of which we placed our horses (of which we had 10 left), and on the other our baggage, joining them both together. This occupied us until the 21st September, when we started. The breadth of the Zeya at this part is 300 fathoms (2100 feet English), with a current of  $4\frac{1}{2}$  versts (3 miles) per hour. Proceeding 32 versts (21 $\frac{1}{3}$  miles) by the intricate bends of the Zeya, we observed boundless meadows on both sides; it is only from thence that the ridges commenced to advance, first on the right bank and soon after on the left, contracting the river, and causing it to pursue its course through a narrow defile. The current at the same time increased in rapidity: stones began to appear at the banks and in the middle of the stream, their presence being indicated by the water occasionally splashing over them. These increased in prevalence the farther we proceeded, until at last the river

became disturbed across its entire breadth, rocks making their appearance in many places above the water, which dashed with a loud noise against them, and covered the surface of the river with foam. The raft was being carried down with great velocity. We now expected rapids and kept our eyes fixed on the water, whilst we steered with difficulty through the rocks, which each moment threatened to dash our raft to pieces. In this manner we hurriedly passed by another mountain gorge, through which the Gilui rushed, and I had scarcely time to observe a small stone mound—a Chinese boundary mark—surmounting a perpendicular and steep peak on the right bank of the Zeya and left of the Gilui.

For 22 versts (14½ miles) more we floated past similar places, leaving on our left the Algai rivulet, and on our right the Baramakan and Ilachumra. Beyond this distance the mountains receded abruptly to the right and left, a broad valley covered with high and rich grass opening out before us: the river became broader, and the current so feeble that for a long time the raft appeared stationary. Subsequently, however, we often met with a similar current. The next day, on the 24th September, we met Tungus-Manegers for the first time on the right bank at the mouth of the Mokchi rivulet. Their hut of birch-bark stood on the very bank, so that we saw it from afar; but they fled as soon as they perceived us, and only ventured to approach after we had passed an hour in shouting and encouraging them to advance. Glad as I was at meeting them, the plan I had formed beforehand was frustrated. Although the Manager had horses, he could not be persuaded by any presents to conduct us to the Selindja River, affirming that both his family and himself would be deprived of life were the circumstance to reach the ears of the authorities. He agreed, however, to proceed with us until we should meet with other Manegers.

After an hour or two we quitted the bank and proceeded on. The Manager accompanied us to the Umlekan, which falls into the Zeya on the left. Here we met other Manegers, who received us cordially. They were not so shy as the first, but that was perhaps owing to the Manager who was with us blowing a wooden horn on approaching their huts. Before reaching this place we had passed on the right the Ur and Shingal rivulets, which, like the Umlekan, are historically celebrated for the first journeys of Poyarkof's brave band. These Manegers were likewise inexorable to my offers. They readily, however, consented to accompany us down the river, and in this manner we reached the Selindja, under, as it were, their surveillance, and daily met several families. They encamp at night at the banks of the river, in order to watch for the crossing of wild goats; their sole occupation

at that season of the year. We reached the mouth of the Umlekan on the 28th September. From hence the navigation continually increased in difficulty. Strong winds set in, and the ice, which had made its appearance on the 25th, was gradually accumulating. It was less prevalent and disappeared only when the wind abated; this generally occurred during the night, when we were obliged to make long distances.

By the light of the moon we could follow the bends of the river and observe the changes in scenery. Accompanied thus by the Manegers we floated on until the 1st October, when we came to a place 4 versts ( $2\frac{2}{3}$  miles) distant from a rocky island, dividing the Zeya into two narrow branches, the left of which is considered dangerous by the natives. From the mouth of the Umlekan we had now made 247 versts ( $164\frac{2}{3}$  miles), and had passed on the right the Ulanga rivulet and seven others, whose names we did not learn from the Manegers, and on the left the broad river Dep. Proceeding farther on the 2nd October, and meeting with similar difficulties, we passed on the right the rivulets Ivur, Lomogdo, Habaikan, and two others without names; on the left the rivulets Dabkur, Gromko, and Oio; and at last, on the 3rd October, reached the mouth of the Selindja, the eastern affluent of the Zeya. It falls into this river in many branches, forming an extensive delta, consisting of several low islands covered with thick willows. These conceal the mouth of this mighty river, and we should not have perceived it had it not been pointed out to us by a Maneger. This circumstance probably prevented Poyarkof from observing it, as he made no mention of it in his account. Here I was surrounded by a countless number of Manegers, it being a place of rendezvous for the whole tribe, under the command of a dzanjin (elder) and two kovans (assistants). They were going to start for the upper course of the Selindja to hunt the squirrel and beaver. Taking advantage of their kind and hospitable reception, I turned the conversation on the Selindja and adjacent country. It was difficult to make their accounts agree; many corresponded, but as great a number were contradictory, and they appeared afraid of giving any real information, as they never named a single river. The mean deduction from their statements would be as follows:—The Selindja is as large and deep a river as the Zeya; its current is feeble at its lower course and only more rapid from its middle. It flows in a straight direction without the sinuosities of the Zeya and Shilkar (Amur). Of the larger rivulets, the Manegers particularly mentioned one which was distant  $2\frac{1}{2}$  days' journey on horseback from the mouth, and flowed into the Selindja on the right. Many other small rivulets fall into it, but it has not so many branches as the Zeya. It flows to as great a distance as the Zeya does from the



mouth of the Gilui to its head. There are extensive meadow lands before reaching this large river, where the Maneger horses are depastured in spring and summer; they also extend a short distance up the river and along the Selindja. Mountain-ridges, though existing, are not high, but glaciers occur approaching the upper course, which are, however, also to be met with at the middle course. The Manegers seldom penetrate as far as the head of the river, but mostly keep at the lower and middle courses, also between the Zeya, the lower course of the Dep, and the above-named large river. From this I think it may be inferred that pasturage, available for horses, prevails only in this region, and that higher up these rivers, the ridges, woods, and morasses are most likely not clothed with any luxuriant vegetation.

From the mouth of the Selindja the character of the river banks changes abruptly. Hitherto the river had flowed through extensive and completely open tracts of country, and it had either been contracted by cliffs or bordered by mountains first on one bank, then on the other. On approaching the Selindja, however, the hills recede, and extending first along the right bank in the direction of the Haibakan river, then retiring on the left towards the east, disappear in the valley of the Selindja. A straggling forest of red and common pine, larch, and birch, had hitherto been visible on the mountain tops and occasionally on some small slopes, but here a flat and treeless valley spread out on either bank. Luxuriant and high grass intermingled with bushes of the wild rose covers a boundless extent of country; morasses, occasionally forming lakes, occur where the surface is more depressed. Such is the country through which the Zeya flows for 107 versts (71½ miles). The chain of mountains then gradually approaches the river on the right, forming at last a scarped bank. This is the group of mountains abutting on the Zeya, which Milovanof called in his interesting report "the White Mountains."\* They consist of marl over a clayey schistus.

These mountains continue to extend for about 9 versts (6 miles) more at the very edge of the river; then, receding somewhat aside, they form a broad valley between them and the river. Approaching again, they are once more interrupted for about 3 versts (2 miles), where a third spur runs on for about 2 versts (1½ mile). Several low islands lie scattered opposite the end of the second projection, concealing the mouth of the river Tomi. Farther on a group of hills retiring from the edge of the river extends along its course, forming a rich valley of meadow land. For 60 versts (40 miles) from the mouth of the Tomi wood is visible on the

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\* Milovanof was despatched in 1681 by the Voévod Voekof to survey carefully the valley of the Zeya.

summits, and occasionally on the slopes of the hills of the right bank; but it gradually disappears. The mountains first approach the river, then again recede, and, like the valley itself, are covered with forage-grasses. Their remote chains become lost in the distance, and are likewise not wooded, with the exception of the slopes and alluvial soil, where detached trees are visible. Extensive valleys, available for agriculture and colonization, may possibly exist beyond these mountains. The valley on the left bank is not broken; hillocks, however, occasionally occur, and low sloping hills appear in the distance. The banks are everywhere low with a rocky edge.

The soil is argillaceous and of a sandy clay, covered in places by "tchernozëm," forming sometimes a stratum half an arshine\* in thickness. I am of opinion that agriculture and cattle-breeding might be introduced on a large scale, and extensive settlements made on these fertile plains; but as yet they have afforded no benefit to any one, and remain unreclaimed by man's labour. Milovanof was the only person who had hitherto admired the varied vegetable nature of that region. The Zeya is almost broader at the mouth of the Tomi than at the mouth of the Selindja. I was not even able to count the islands which obstruct the mouth of the latter river, as well as the Zeya, and through which we made our way with difficulty.

The current, especially at the White Mountains, is so feeble, that the raft seemed to be moving up the river. This place we passed on the 6th October, when we lost our last horse. The Cossacks who accompanied us affirmed that our horses had perished from eating the submerged grasses on the depressed banks of the river.

We continued our course down the river on one raft; the navigation, nevertheless, was still very difficult; enormous masses of ice pressed against the raft, and it was only with great exertion that we got through them, being even sometimes carried away by accumulated floes. In this manner we proceeded, keeping mostly to the right bank, until the 8th of October, which was the last day of our voyage—it being impossible to proceed farther on account of the ice, with which the river was now covered. From the mouth of the Gilui to this place we had made 808 versts (538 $\frac{2}{3}$  miles). Having only half the carcase of a horse left, I divided my men into two parties, and proceeded with one, consisting of three men besides myself, in search of a Manchur village. The other men were to await my return for 10 days, and then to follow my track if I had not joined them within that time. On the third day we reached the first Manchur village, which was 60 versts (40 miles) distant from our starting place.

\* Arshine = 0·758 yard, or 2·333 feet.

We were there met by two Manchurs, and led into the assembly-house, where all the inhabitants of the village were soon collected. My chief object was to succour the men I had left behind, and I therefore entreated the Manchurs to give me provisions and horses, for which I offered remuneration. The whole night was spent in questioning me and in consultations as to our disposal. No answer was given to my request for assistance. They made their own arrangements, and the next morning sent three Manchurs, accompanied by one of my Cossacks, with 30 lbs. of millet to the relief of my men, deciding at the same time to deliver me up to the authorities of Sahalian-ula-Hoton.

Travelling only by night, we were on the 15th October brought to the last village opposite the town. The Manchurs always found pretexts for detaining us in the villages during the day. It was only at this place that I positively ascertained the existence of the Ust-Zeysk \* Russian military station. The Manchurs remained inexorable to my request to be sent over to the Russian Cossacks wintering at that station, and on the evening of the 16th, when the state of the ice on the Amúr became more favourable, we were taken across to the town. There we were placed in the assembly-house, and, after a long cross-examination as to our motives for appearing in their territories, which I tried to answer as briefly as possible, adding that I relied on their friendly disposition towards Russians, it was at last decided by the "amgun," who received us very kindly, that we should be sent to the Ust-Zeysk station, and that provisions should be forwarded to the party we had left behind. On the 17th I reached the station, whence 15 Cossacks were at once despatched to the assistance of the remaining portion of my men. Above all expectation, the Manchurs came to the station with my chattels, instruments, and men on the 29th October.

On the 4th November I quitted Ust-Zeysk, and, journeying up the Amúr, reached Ust-Strelka on the 8th December, whence I proceeded to Irkutsk.

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*A Winter's Journey up the Amúr, from Nikolaevsk to Ust-Strelka, in the Year 1856-7. By M. PARGACHEFSKI.*

M. PARGACHEFSKI left Nikolaevsk on the 16th November, 1856, and after making 11 versts ( $7\frac{1}{3}$  miles) reached the Gilyak village of Kaki, where the dogs were rested, it being necessary to halt at night, in order that the latter might bear the fatigue of a journey to the military station a little below the mouth of the

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\* Or Ust Zeya, i.e., mouth of Zeya.—*Trans.*

Sungari, at which place M. Pargachefski hoped to find a Russian picket.

After experiencing a terrible snow-storm, or "purga," they reached the village of Mago on the 18th, meeting on their way a great number of Gilyaks with sledges laden with a kind of carp, which they had caught under the ice. At Tyr, another village, where the Amúr flows in one stream, and is of a breadth of not less than 3 versts (2 miles), the party slept in a newly-constructed post station, superintended by a Cossack.

On the 19th November, says M. Pargachefski, after making 25 versts (16 miles), we stopped at a post station. After taking tea we started again and arrived at the village of Novo-Mihailovsk, which is just being built. Four houses are already constructed and occupied by peasant immigrants. We stopped at one of them; and after warming ourselves, I questioned the inmates of the house as to their mode of life. By their replies they appeared well satisfied with the new country. They rely chiefly on agriculture and kitchen-gardening, their lands being rich. The Amúr peasants were well contented with their experimental harvest of the foregoing summer: corn and vegetables were produced in abundance; their attention is also directed to the great abundance of fish in the rivers, and to the carriage of passengers and goods from Nikolaevsk to Kizi. They likewise supply the mail with horses at 150 rubles the pair for the 5 winter months. These circumstances, and the advantageous agreement made with the authorities for the supply of wood for the use of the steamers employed on the river, guarantee the prosperity of the Amúr immigrants.

We left on the 20th, and after making 12 versts (8 miles) reached Mihailovsk village. Fifteen houses are already built there, and Russian life was portrayed in many things. Cattle, horses, and sheep were being reared with success. The immigrants informed me that they had discovered in the neighbourhood of their village, beyond the ridges of the river bank, extensive steppe pasturage grounds, to which they drive their cattle for the summer, especially the sheep, which thrive extremely well there.

Between Mihailovsk, which I quitted on the 21st November, and Bogorodski, the next village, we met three peasants, who were returning from the chase. They stated that the elk does not roam here in pairs, as in Siberia, but in droves. At Pul village we were cordially received by the Gilyaks. We there met some Manchurs who had arrived for the winter for the purpose of exchanging Chinese spirits, tobacco, and millet, for sable and fox skins. We entered the hut of three Gilyak brothers of prepossessing appearance. They at once commenced assuring us of their good disposition towards Russians, as a proof of which they told us they

did not belong to the Gilyaks, who eat dogs; but that, on the contrary, they abhorred such food. To manifest their love for the Russians they said they were ready to join them in their faith likewise, and to be christened as soon as Father Gabriel should arrive. This capacious Gilyak hut contained 60 persons, including guests. Several Samagirs (Samagirtsy) from the central region of the Amgun were there, and these good people informed me that they had also arrived for the purpose of being christened. The Nagidals and Samagirs of the Amgun are generally well spoken of, and they are well disposed towards Russians. But I am sorry to confess that we did not find them in a state of sobriety. A passion for drinking has already taken deep root among them, and the Manchurs, the propagators of that evil, fleece these tribes to a pitiful extent and continue to supply them with spirits in large quantities, whilst its introduction is forbidden to Russians. I know from good sources that the Manchurs have this year imported as many as 700 boxes of Chinese spirits, or more than 4000 Russian vedros.\* A prohibition against the Manchur introduction of spirits distilled from millet would be very beneficial to the natives; besides the demoralizing effects of such a trade, it enables the Manchurs to obtain all the valuable furs of the country, which Russians have then to purchase from them. A clerk whom I sent to these parts only succeeded after some time in getting 40 beaver skins from the Gilyaks; whereas he bartered 400 in one day from a Manchur trader. It is worthy of remark that the Gilyaks and Golds, from Pul village up the Amúr as far as the Sungari, are almost in a state of complete indigence in consequence of the rapacity of the Manchurs; whilst the Gilyaks of the lower course of the river, where their oppressors dare not appear, are incomparably better off. They are well acquainted with the value of Russian coins and hold them in great estimation. Many of the natives here are rich. I was repeatedly told by Gilyaks and Golds that the despotism and violence exercised by the Manchurs in their bartering transactions have long been insupportable. They were very well satisfied, on the contrary, with their new relations with Russia, and openly expressed their wish to throw off the yoke of the Manchurs. By others who evinced the same good feelings towards Russians I was often asked "why the present Russians do not oppress or kill them," it having hitherto been handed down from generation to generation that the first Russian Cossacks had ruined their ancestors by their violence and depredations.

In the village of Pul I treated a Gilyak family and their guests with tea and tobacco, with which they were apparently much

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\* Vedro, equal to 2·707 gallons.

pleased. I here hired two Gilyaks with two sledges for 19 thalers,\* to take me to the Mariinsk station, on the condition that I should reach it next morning, as I wished to find the governor there. Having left the mail and baggage behind, we were carried along by the dogs with incredible swiftness. We proceeded forward at the rate of at least 15 versts (10 miles) per hour. On the road we were met by the governor, who was travelling with post horses, and there being no longer any necessity for pressing forward, we relaxed our speed and reached the Irkutsk settlement by 2 A.M. Here I rested and warmed myself in a clean Russian hut. The local inhabitants had introduced vegetable gardens, and the tillage of the open and fertile lands which abound there, with great success. Their productions, exhibited at the last show, proved superior to those from other places. We started at sunrise, intending to stop at the populous village of Aur, for the purpose of giving the dogs rest. This place is particularly celebrated for a breed of dogs greatly resembling hounds. These dogs, which are generally of a gray colour, are pretty large, lean, and very light of foot. Here we also met Manchurs. The Gilyaks complained of the shameful manner in which they were being robbed by them. Proceeding farther we passed the villages of Kado and Pulza, lying, like all those before mentioned, on the right bank of the Amúr, and to our great joy at last reached the Russian Cossack village of Suteh. Towards evening we arrived at Mariinsk station. Everybody there was surprised at my intention of ascending the Amúr, and many persons of experience asserted that, in consequence of the scarcity of fish in many places up the river, I should not be able to procure food for my 40 dogs. This did not, however, make me alter my resolution. The Manchurs had circulated many false reports to make me abandon my intended journey, which they wished to prevent, being well aware that I would gather information for the Company.†

I remained at the Mariinsk station from the 21st to the 30th November. During this time incessant snow-storms prevailed. On the 30th, the day of our departure, the weather cleared, but a storm again arose as we were preparing to start. We left Mariinsk, notwithstanding, with four sledges and a stock of provisions for four months. Having made 15 versts (10 miles) along an extremely bad road covered with deep snow, we gained the village of Golni, where we halted for the night. Snow had fallen in abundance between Kizi and the Giryn (Goryn)—8 halts distant from each other—greatly impeding our progress,

\* American dollars?

† Probably the Russian American Company.—*Times*.

and giving rise to the first doubt as to the possibility of proceeding farther.

We reached Djai (Djauri) village on the 1st December. It is very populous, but nearly all its inhabitants were absent hunting the beaver; the old men, women, and children, and some haughty Manchurs, alone remaining. I was informed that one of the latter had started up the Amúr that morning, and we subsequently learned from the Golds that an account of our movements was being passed on from one Manchur to the other. The news of our journey reached the authorities at the Usuri and Sungari long before we arrived there.

Leaving Djai on the 2nd of December, we directed our course towards Puls village. There are extensive meadow-lands and sloping pasturage grounds opposite this village. Attention should be directed towards this fertile tract, which is moreover unoccupied. From the 3rd to the 5th December we proceeded in a direction towards the villages of Hyvan, Déré, and Pesáé. The Gilyaks received us very kindly every where. They furnished us with a stock of fish for our dogs, which they sold very willingly and at a cheap rate.

On the 6th December we reached the most populous village of Addi (Adza). It consists of 15 huts, each of which has at least 20 inmates. This is the last Gilyak settlement; the Golds of Tungus origin commence beyond. The village of Addi is the central point at which the Manchurs assemble to barter with the natives. The influence of the former is still stronger here. This we practically experienced when buying fish for the dogs, which the Manchurs greatly raised in price, thinking we would not be able to afford the expense, and so be obliged to return.

On the 7th December, having passed the village of Kulga, we halted at a locality called Niungui, and again met some Manchurs, who had succeeded in exchanging a considerable number of beavers from the Gilyaks and Golds. This day we passed the embouchure of the Goryn river and reached Keurmi.\* A fever was devastating the population from this point to the mouth of the Sungari; many had fallen under it at Keurmi, but higher up it appeared less virulent, and the number of fatal cases less frequent.

Proceeding farther, from the 8th to the 10th December, we arrived at Halbu village, where we halted for the night; on this course we rested at an isolated hut of a Manchur who had settled there with a Gold from the Sungari; they have carried on a trade there for many years.

We left Halbu on the 11th December, and reached Hadéék

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\* Keurmi, by Petchurof.—*T. ans.*

and Sadcék villages, remarkable for their populousness. The adjacent open lands consist of excellent soil; agriculture might be introduced there on a large scale; low meadow lands, producing excellent grass, according to the natives, likewise occur there. Starting from here we arrived at Hotar village, situated at the mouth of the Hungari. Here we met the clerks of a Russian merchant who were engaged in trading; also two Chinese, one of whom was diligently studying the Russian language. He was in the habit of addressing himself to every Russian traveller for the Russian interpretation of words, which he immediately noted in his book. These Chinese were carrying on a trade in tobacco and spirits.

In Hotar village I obtained a very interesting piece of information, namely, that in winter by following the Hungari from its mouth upwards with dogs, Port Imperial could be reached in seven days. By an approximate calculation I conclude that the Hungari has a course of 300 versts (200 miles); but it must be observed, that the ascent of this river, during summer, will be very difficult, its current being extremely rapid. The country below the mouth of the Hungari presents extensive valleys suitable for agriculture and meadows. All this information I obtained from a man, belonging to the commercial house of Kuznetsof, who was well acquainted with the surrounding country. We halted here for two days.

On the 15th we proceeded forward as far as Mai village: here, after passing the Hungari, the waters of the Amúr unite and continue their course in one stream. We now travelled along a very difficult road, keeping close to the precipitous banks, against which enormous icebergs were piled. Mai village is situated at the base of a rocky cliff; an extensive lake, with several islands inhabited by Golds, occurs opposite to it. I was told that this lake abounds in good fish.

We journeyed two days and two nights, including halts, from Mai village to a locality called Dolen\*. Here I met a trading Manchur, the agent of a commercial house at San-Sin, who received me very politely. The village of Dolen is situated on a picturesque, open bank. It consists of two settlements, the lower and upper; the first of these had been entirely abandoned by the inhabitants in consequence of a ravaging fever which had prevailed there. It is remarkable that the tribes of the Amúr forsake their dwellings on the first appearance of this epidemic, and disperse in the woods, where they reside in huts at a distance from each other.

On the 17th December we reached Bundun village, near which

\* Dolé, village of Peschurof.



the Dondon-bira river falls into the Amúr on the right. This village is partly spread on the mainland and partly on islands. Here we took tea, while a Cossack obtained fish for our dogs. Leaving Dundun village we crossed over to the left bank of the Amúr and proceeded in a straight line, halting for the night at Kúrún village, which consists of only two houses, situated on an island. We here met with a cordial reception from the Golds, who, running out of their houses, assisted the dogs to ascend the steep bank. After passing the night with these good Golds we proceeded along a straight stream, whose banks presented a wild and uninhabited locality. During four days we only passed two insignificant villages; nearly all the inhabitants of one of them were ill with fever.

On the 22nd of December we reached the village of Syza, the abode now of a Manchur official, in charge of the frontier station at that place. Previous to the occupation by the Russians of the left bank of the Amúr, belonging to them, he had lived much higher up in Turma village. The Manchur received us very politely, with all the good breeding of an educated Chinese, and gave us an excellent repast. The staff of this Manchur consisted of a secretary, two "boshko," and five attendants. During winter this officer, who, like his brethren, has great influence over the natives, is engaged in trade; for tobacco and spirits he barter a considerable quantity of beavers of superior quality. The Golds do not dare to present themselves to him with inferior furs, and woe to him who should venture to do so, as he is unmercifully beaten with sticks on the slightest suspicion. In this small village the Golds successfully cultivate the Chinese cabbage, beans, pumpkins, onions, and garlic, and grow sufficient to last them throughout the year.

On the 23rd December, following the Amúr, we passed the Gold villages of Mesur, Ketsyr, and reached Turmi, at the very mouth of the Usuri, where we found four neatly arranged huts. Each house had a vegetable garden attached to it. I here ascertained that the mountain range along the right bank of the Usuri particularly abounds with excellent oak, larch, and cedar trees, suitable for building purposes, sheltering a variety of wild animals. I was likewise informed that the banks of the Usuri are mostly populated by exiled Chinese; but there are also some Manchurs there. The inhabitants of both banks of the Usuri are employed in agriculture, which the extent and fecundity of their lands render very successful. They have bred cattle for cultivating their fields, but being often attacked by tigers, it is very difficult to keep cattle in any great number.

On the 25th December, rising early in the morning, we proceeded in the direction of Nungia village, and passed Surjek

village; from which point we were obliged to keep to the left bank of the Amúr, where dwellings may be met with, though seldom.

Reaching Gimpi village on the 27th December, we halted there for the night. After making another stage we gained Danén village, whose inhabitants, of the Gold race, received us in a most cordial manner. I collected much information from them respecting the possibility of establishing commercial relations with the neighbouring population of both banks, and the commodities which they mostly require. Here also, the Golds spoke of the bad treatment they had received from the Manchurs, and of the oppression to which they were subject in their bartering transactions with them. I presume, on good grounds, that in a short time the river trade with the Amúr tribes will fall into the hands of the Russians, for the natives of those parts clearly perceive the advantages of commercial intercourse with them; their fur goods are valued fairly, and prices increase yearly. It must be observed that commencing from Danén village the population use fire-arms.

On the 29th December we passed the Gaidjan and Sulvi villages; the latter is situated on an island. I found that the Russian-Cossack station, opposite this village, had been removed in the autumn. Their horses had been left behind, being unable to cross the marshy country of the left bank, and I therefore endeavoured to secure them for my party, and ultimately succeeded after much opposition from the Manchur authorities at the Sungari. I was here obliged to give away my dogs, having previously ascertained that it would be impossible to procure food for them higher up. We had by this time made more than 1500 versts, (1000 miles) with them in 19 days including all stoppages. During my stay at Sulvi, a large tiger was brought in by a Gold, who had killed it in its lair; the animal was placed against the wall, and all the natives made respectful obeisances before it, addressing it as "Mr. Tiger."

The region between the Usuri and Sungari which we had just traversed, is only remarkable for its right bank, which admits of extensive cultivation; the left bank is generally depressed; the waters of the Amúr, encroaching on it, have formed a great number of streams, lakes, creeks and marshes; and the hills recede there for a considerable distance.

Having at last procured the horses, we started on the 12th January, and at 4 p.m. reached the mouth of the Bidjan, which takes its rise in the Hing-Gan range, and falls into the Amúr on its left bank. One of the chief affluents of this river, the Djujur, is remarkable for the circumstance that lamellæ of silver are found in many parts of its banks; the Golds, however, dare not take any, as they say that whoever ventures to do so will during his

whole life be pursued by evil spirits. One of the Golds offered to show me this treasure, but for a considerable remuneration. These accounts of the existence of silver ought to be investigated. It was impossible for me to inspect the locality during winter, and besides, the Djujur rivulet was at least 300 versts (200 miles) distant. It will in every case be interesting to verify this statement of the Golds. The silver lamellæ closely resemble the tellurium silver found in lamellæ in the Ural and Altai mountains. The Golds, moreover, communicated to me the interesting fact, that as the waters of the Djujur rivulet run from w. to e., the journey may be shortened by about 200 versts (133½ miles) by following its course.

On the 12th January we halted for the night a little above the Bidjan river. On the 13th, 14th, and 15th, we pursued our journey through open places, meeting only one habitation.

On the 16th we entered the rocky defiles of the Hing-Gan, where the Amúr flows in one stream. Proceeding with my Cossack through this wild and mountainous tract, along an extent of 150 versts (100 miles), it was necessary to be armed with great patience, and above all, not to lose heart. We moved forward through deep snow, with horses that could scarcely lift their legs. A narrow path, which had been trodden down by hunters in the beginning of the winter, wound here and there. Tracks of tigers and wolves abounded all over, and we were afraid of being attacked by them during the night. The greatest inconvenience suffered by us during our journey through these defiles was the total absence of forage.

At last, on the 21st January, we emerged to our great joy on an open tract of country, where we halted for a day. As we had proceeded but very slowly through these mountain-passes, I was able to study the banks of the river. In some places narrow valleys facing the south occur. There is no doubt but that small settlements can be made in such places; and the hills would afford valuable hunting grounds. On passing through these gorges during the summer, I was informed that wild bees, whose honey is highly prized, are plentiful there. According to the evidence of the Golds and Manchurs, the Amúr is not at all so abundant in fish in these defiles as at its lower course; it is also remarked that on approaching its upper course, or from Sahalin-ula-Hoton to Ust Strelka, "red fish" are caught only in inconsiderable quantities.

We proceeded forward on the 23rd January, keeping for some time along the right bank, and meeting only one hut, which we found occupied by some women and children; the men had gone to huntsables. They were not able to give us any provisions, and we were obliged to continue our journey for 30 versts (20 miles)

with only a small quantity of millet remaining. On the 24th we reached, on the left bank, the dwelling of a local Manchur authority. Although he received us very kindly, he was likewise unable to assist us, his own stock of provisions consisting only of a small quantity of hulled barley. We started again, and coming to a Maneger hut, were highly delighted to obtain half a wild goat, which lasted us as far as the Manchur villages near Sahalin-ula-Hoton. We were again obliged to abandon a worn-out horse.

From the 25th to the 28th January our road lay over open and extensive tracts. Leaving the river we ascended the picturesque valley of the Buriya, keeping along a pathway with some Solons and Dáurs who were proceeding to Hing-gan with pack horses laden with their produce—spirits, groats, and flour—which they were going to exchange for the sable skins of the Manegers. We passed several nights with them, and always had the place of honour assigned to us at the bivouac fire. On leaving, they called us friends. The valley of the Buriya presents extensive lands for the introduction of agriculture and for the depasturage of cattle. According to the native population, this is the most favourable place in the neighbourhood of the left bank, and the upper course of the river, bordered by mountains, abounds in various fur-bearing animals.

With great difficulty we reached a Manchur village on the 28th January. To our astonishment we were met by an official from Sahalin-ula-Hoton, who had arrived considerably before us. He said that he was ordered to conduct us to the town, at which we were exceedingly glad, as our horses could scarcely proceed any farther. After a short rest, two oxen attached to a sledge, of which the slides and shafts were made of one piece, were brought to us, and with them we proceeded at a foot's pace. The official would not consent to my leaving the horses behind, so I was obliged to have them harnessed to a sledge and to take them with us. The Manchur official left before us in order to prepare sledges. From here, villages frequently occur on the right bank. Each village is separated from the other by thick groves which are carefully preserved. According to the Manchurs, the trees protect them from the cold northerly winds. No wood is allowed to be cut in these groves. The frequent change of oxen became very tedious; but as we halted every 5 or 7 versts we had opportunities of inspecting the villages. Their inhabitants live very comfortably, being all occupied in agriculture and kitchen-gardening; large ricks of barley, oats, and millet were everywhere visible. Extensive plains, abounding in rich grasses, spread out before us towards the town; cattle-farming, notwithstanding, is on a very limited scale. The Manchurs only keep cattle for the cultivation of their fields. During my conversations with the inhabitants of

the villages, I observed that they answered me with reluctance in the presence of the official, and entirely avoided explanations. Notwithstanding my insistence, they refused to take anything either for carriage or food; but as soon as the official was out of sight, they at once became more obliging and polite, and willingly entered into conversation. After a fatiguing journey we reached Sahalin-ula-Hoton on the 2nd February. At the middle course of the Amúr we had fortunately not experienced more than  $10^{\circ}$  of frost; we had travelled along the right bank, where there was but little snow on the ground. We entered the town at 5 o'clock in the afternoon, and were at once examined as to the object of our journey. Having inspected our papers and "route-blanks," the official reported us to the Amban, and before an hour had elapsed, we were furnished with horses and sledges for our journey farther. We asked to be allowed to remain in the town for the night, but receiving a flat denial, were obliged to make for Tudega, the nearest village, where we passed the night.

On the 3rd February, after passing 25 versts (16 miles), we reached Amba-sahalian, the last Manchur village, situated on the right bank of the Amúr. Four versts from here on the left bank is a Russian Cossack station; the mouth of the mighty Zeya is at a distance of 7 versts ( $4\frac{2}{3}$  miles) from it. We were escorted from the town by a Manchur official, who had the superintendence of the Chinese station of Amba-sahalian, and by whom we were delivered over to the Cossack chief of Ust Zeysk station. Here we enjoyed some repose. Three days sufficed to recruit our strength, and by that time we had entirely forgotten the sufferings we had undergone. On the 6th February I left with the mail with five horses, under the escort of four Cossacks; the Cossack who had accompanied me was sent back to Nikolaevsk with the Irkutsk mail. We proceeded on horseback along the left bank, across a high plain, extending for 250 versts (116 miles). An excellent cart road might be made there. After 24 hours we reached an extensive meadow. On descending towards it, the Cossacks told me that during the last summer they had discovered coal in great quantity on a neighbouring island of the Amúr, and that when the waters had entirely subsided in the autumn, they had found large masses of that mineral on the surface of the island, and which they had since used. They said the coals burned very well, "but had a heavy smell." The meadow, which we followed two days and a night, is more than 70 versts (46 miles) in length. At a place near the Amúr there is an old square wall surrounded by ditches. The front of this earthwork is a verst in length ( $\frac{2}{3}$  mile), and not far from it, higher up the river, we counted the remains of as many as ten detached fortifications. To the best of my knowledge no traveller had hitherto seen these

ruins. I think this must have been a temporary Chinese encampment, thrown up when they retired from Albazin in 1688, after the boundary treaty of Nertchinsk.

Proceeding along the plain we met a Maneger hunter, who, among other things, asked me why Russians passed there so frequently? On the 10th of February reached the Russian Kamara station, on the left bank of the Amúr, where we changed horses. Our neighbours, the Manegers, Solons, and Dáurs of the Kamara and Gan rivers, often come to this place. These natives had taken a liking to the Cossacks, and lived very amicably with them. Here I had time to collect a good deal of valuable information with respect to the trade with the natives. A fair, at which all the tribes of the adjoining country assemble for the disposal of their products to each other, is yearly held in the month of November, on an extensive meadow above the Kamara station. The Dáurs and Solons bring various grain, and the Manegers animals and isinglass. More than 5000 men collect at this fair. We journeyed 10 days from the Kamara station to that of Kutomand, proceeding partly along the river, and sometimes along either of its banks, according to which route we found preferable. After changing horses at the latter station, and a journey of 3 days, we safely reached Ust Strelka on the 25th of February. We had thus made a journey of about 3000 versts (2000 miles), reckoning the various détours, in 3 months, and chiefly at a foot's pace. We only experienced frosts and snow storms between Nikolaevsk and Kizi, beyond which the weather continued warm, with a clear sky. From the mouth of the Giryn the snow was not more than three-fourths of an arshin in depth. Its surface, hardened by north-west winds, easily bore our sledges and dogs. In some places we found glazed frost. Should the Government intend to establish stations for winter travelling along the entire course of the Amúr, the distance between them should not be greater than 50 versts (33½ miles), as the road chiefly lies along the river, and steep and scarpéd banks have in some places to be ascended in reaching the level plains above, and in avoiding the bends of the stream. Where the woods recede from the edge of the river the stations might be built after the fashion of Manchur huts, which are very warm and comfortable. The existence of the men placed in charge of them could be assured with very little care. In constructing the stations they should be secured from inundation, as the waters of the Amúr rise very high in spring and summer, overflowing all the depressed plains and valleys. Excellent models of such stations already exist; eight were constructed in one autumn. At the same rate the stations as far as Ust Strelka might be completed in two years' time, and travellers, on Government or private

business, might then boldly make the journey. I cannot take it upon myself to say in what condition the natives of the river banks will be left on a boundary being drawn between Russia and China ; but I am bound to state that they are at present greatly disposed towards Russians. In addition to their commercial relations with Russia, from which the natives derive great profit, they have witnessed the orderly manner in which Russian military parties have conducted themselves during their frequent journeys both up and down the Amúr. This very important circumstance has entirely dispelled the fear of the native tribes with reference to the inviolability of their rights and their personal security.

Gratitude is due to the commanding officers of detachments for the admirable manner in which they have accomplished journeys beset with so many difficulties.

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TO

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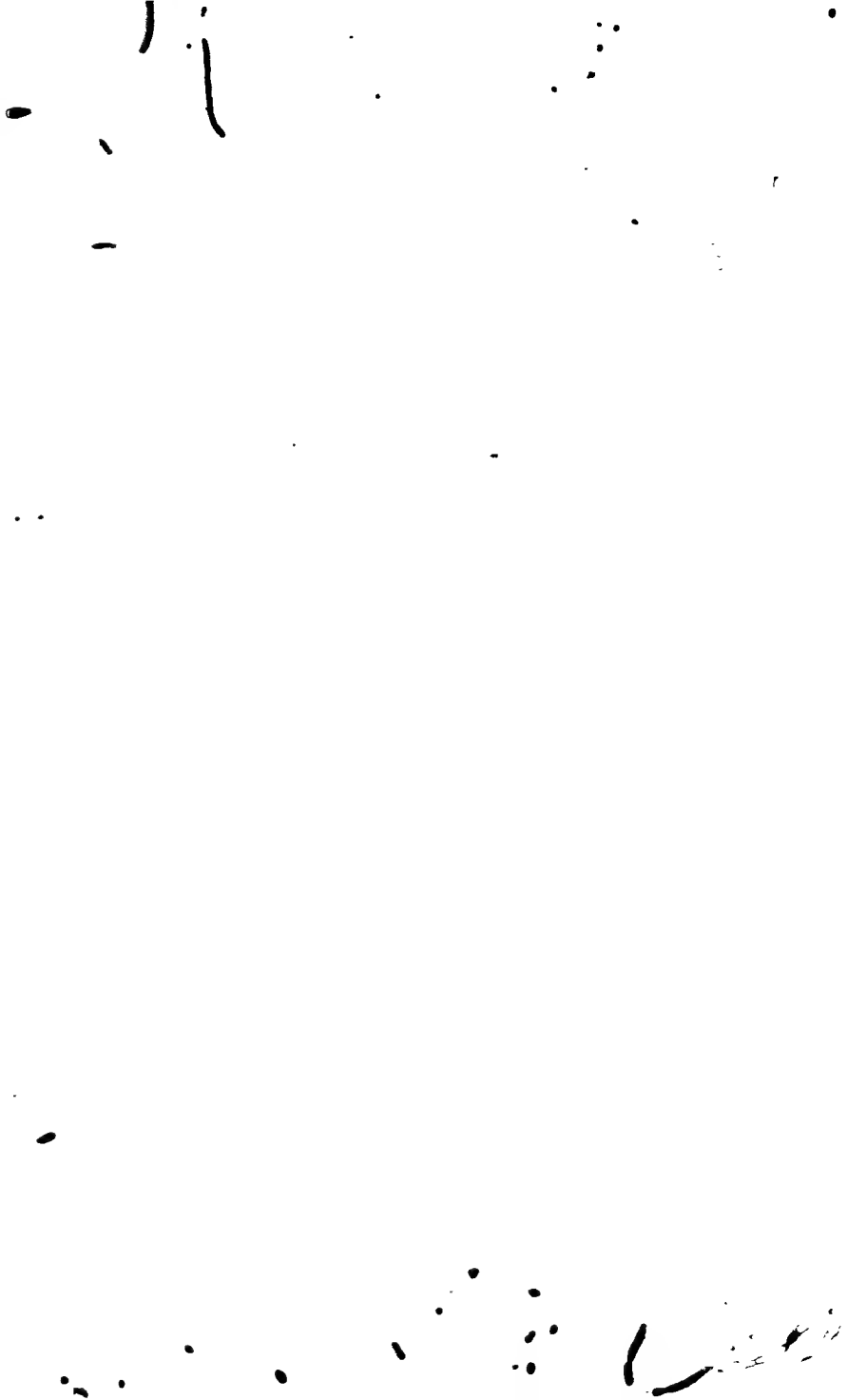
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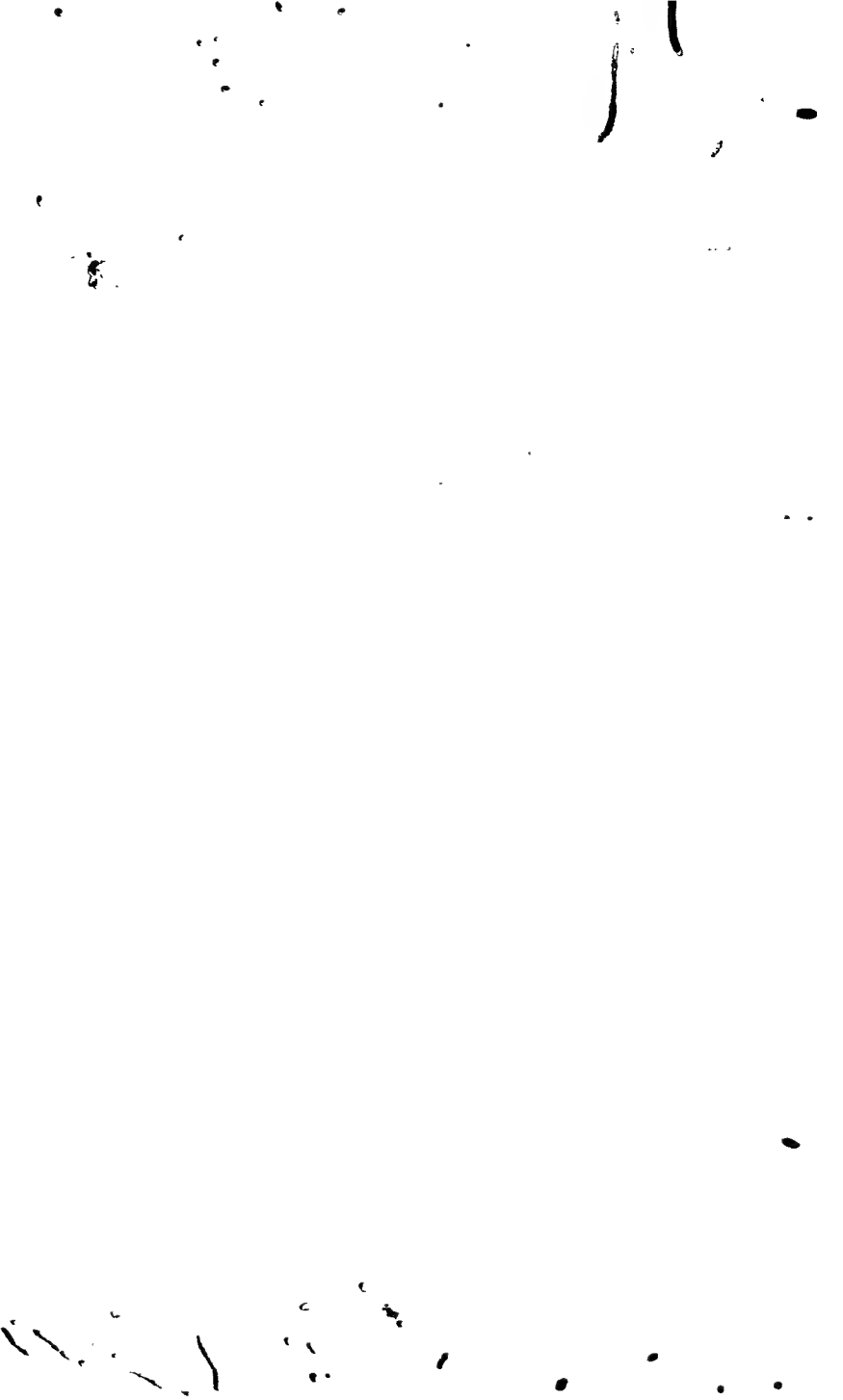
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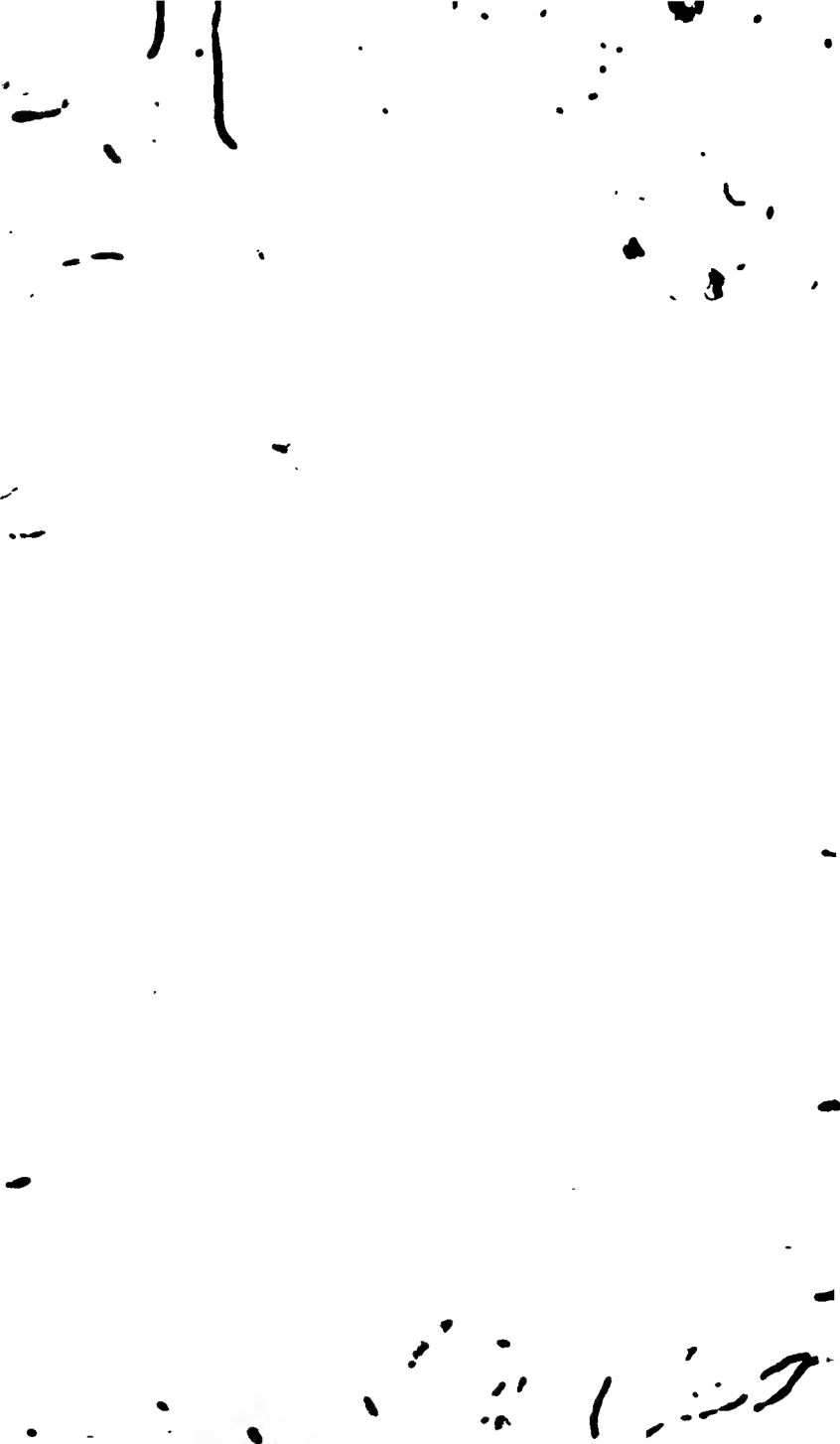
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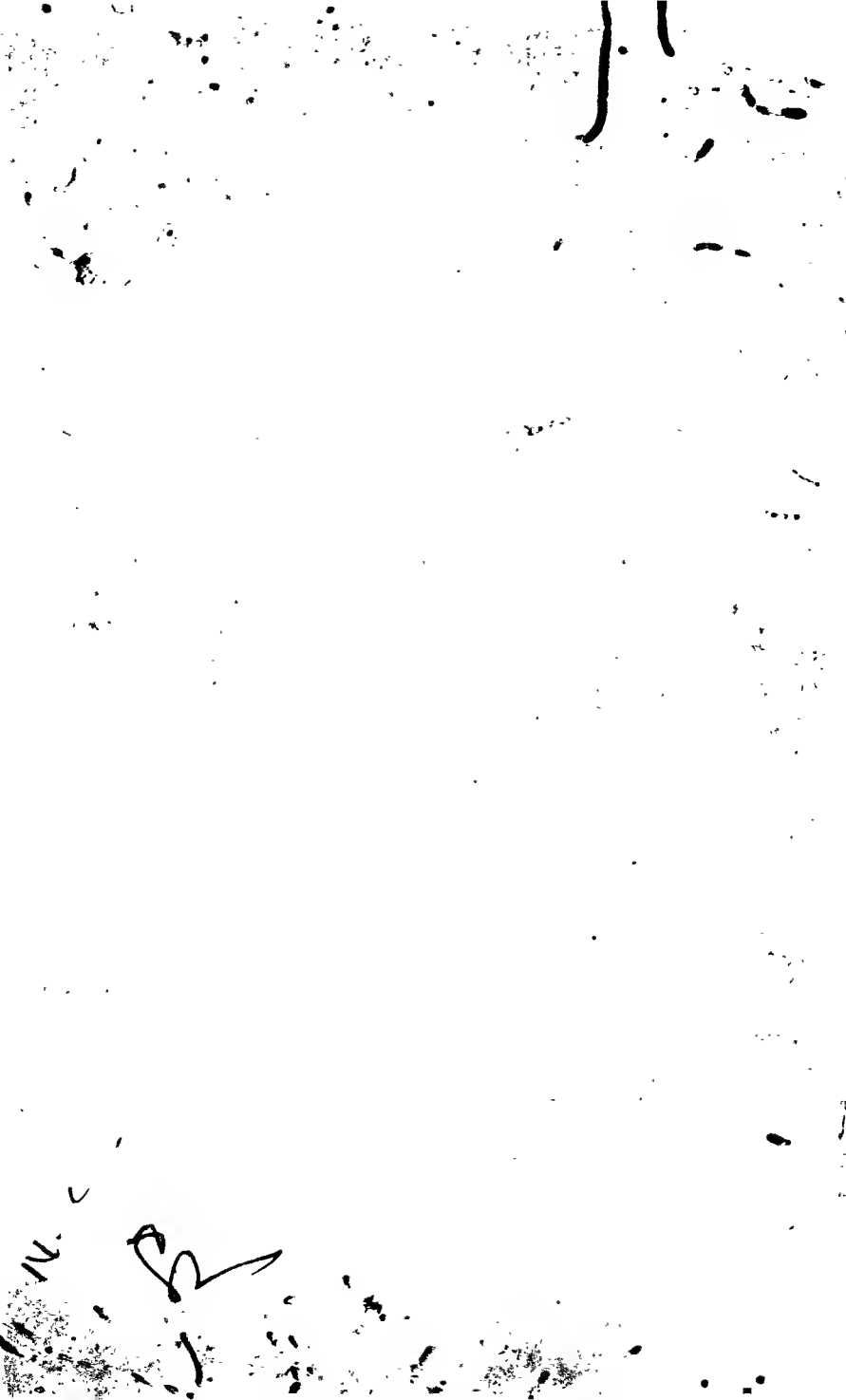
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